THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXVI. No. 906.] LONDON, SEPTEMBER 21, 1880. [32ND YEAR. Price 6d.

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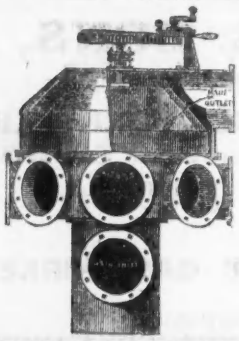
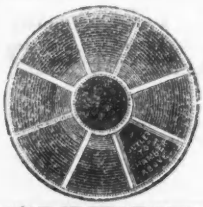
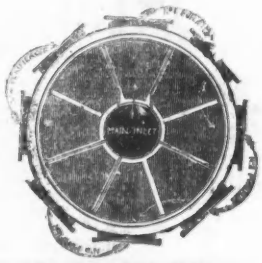


ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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WARNER'S RETORT-HOUSE MACHINERY.

[*As Illustrated and Described in the* JOURNAL *for May* 4.]

Communications to be addressed to

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Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

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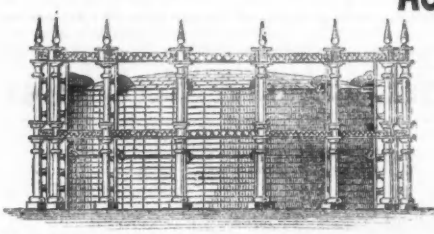

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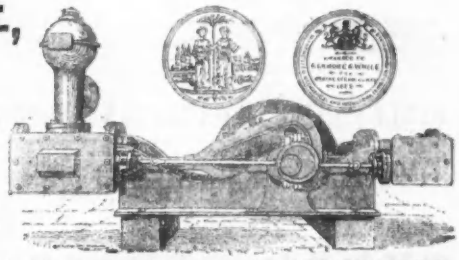

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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PATTERN-BOOKS and PRICE LISTS furnished.

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TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

WEST'S GAS IMPROVEMENT COMPANY.
LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,
And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

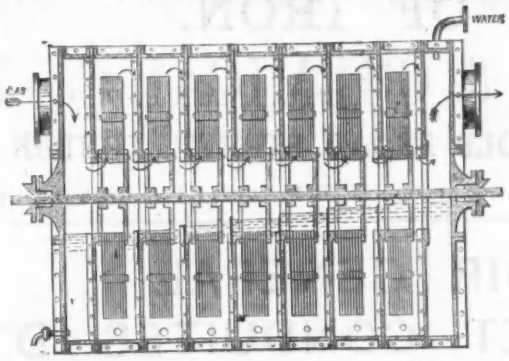
The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*
The advantages attending its use are—

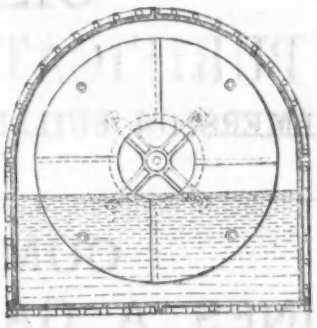
INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER COMPANY.





These Machines contain from 3200 feet to 65,000 feet of Wetted Surface.

The Special Merits of this Washer are as follows:—That it is not necessary to reduce the temperature of the gas to 60°, or thereabouts, to make it effective; **and that as no tar is retained in it, the illuminating power is not reduced as in Tower Scrubbers.** That the distribution of the liquor is made with unerring regularity. That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather. That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided. That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas as it ascends. That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured. That it is much cheaper than any other Scrubber that will do the same amount of work effectually. That it is the only Washer suitable for purifying Gas from all its impurities by solution. That it works with a minimum of pressure. That it takes out every trace of Ammonia from the Gas in once traversing the machine, as well as a very large quantity of carbonic acid and sulphuretted hydrogen. That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

Messrs. KIRKHAM and HERSEY. *The Gaslight and Coke Company, Beckton, North Woolwich, June 8, 1880.*

Gentlemen,—I enclose you some particulars of the working of your Washers here, and I intend having some more experiments made, as just now we are working the first Washer with liquor and the second with water. Of course the fact of our having ordered two more, in addition to the four which we have in use, is a sufficient indication of my opinion of the value of the Washer.

(Signed) G. C. TREWBY.

Messrs. KIRKHAM AND HERSEY. *South Metropolitan (late Phœnix) Gaslight Company, Engineer's Office, June 19, 1880.*

Dear Sirs,—The "Standard" Washer which you supplied for use at our Vauxhall station has afforded me entire satisfaction. It was designed to remove the ammonia from 3 million cubic feet of gas per day, and during the past winter it did so with a good working margin to spare. It is as excellent now in workmanship as in design, and is well worthy of the general acceptance with which it appears to be meeting.

I am, faithfully yours, (Signed) CORBET WOODALL.

Messrs. KIRKHAM, HULETT, and CHANDLER. *The Gaslight and Coke Company, York Road, King's Cross, Jan. 14, 1879.*

Gentlemen,—In reply to your inquiry, I am pleased to say the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia,** while purifying more Gas than it was intended to do. I enclose particulars of a week's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.—I remain, &c., (Signed) JOHN CLARK, Engineer.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 7	11	9	7	5½	3¾	3	1¾	1½	¼	0	10 Gallons.	59,000	Nil.	74°	66°	31°	25	23¼	5
,, 8	9½	7½	6	4½	3	2	1	¼		0	10 ,,	78,000	Nil.	73°	61°	31°	28	26¼	4½
,, 9	11	9	7	5	3¾	2½	1¼	1	¼	0	10 ,,	82,000	Nil.	74°	67°	33°	27½	25½	5
,, 10	10¾	8½	6¾	5	3½	2½	1½	1	¼	0	10 ,,	66,000	Nil.	76°	64°	28°	28¼	27	5
,, 11	12½	10	7¾	5¾	4½	3½	1¾	1¼	¼	0	10 ,,	61,000	Nil.	73°	64°	27°	26½	25¼	5
,, 12	11	8¾	6¾	—	—	—	1¼	¾	¼	0	10 ,,	39,000	Nil.	74°	64°	27°	26½	25½	5
,, 13	13	10¾	8¼	6	4¾	3½	2	1¼	¼	0	10 ,,	78,000	Nil.	73°	65°	42°	28	26	5

Messrs. KIRKHAM, HULETT, and CHANDLER. *Corporation of Birmingham, Gas Department, Saltley Works, May 23, 1879.*

Gentlemen,—I beg to enclose you a copy of the results of the tests which, by the kind permission of the Engineer, Mr. Clark, I made on the 6th of March last, of the working of one of your "Standard" Washers and Scrubbers at the St. Pancras Station of The Gaslight and Coke Company, and I am of opinion that, for an apparatus occupying so small a space, they are exceedingly satisfactory.—Yours truly, HENRY HACK, Engineer.

Working Results obtained from KIRKHAM, HULETT, *and* CHANDLER'S *Patent "Standard" Washer and Scrubber at the St. Pancras Station of The Gaslight and Coke Company, London, March 6, 1879.*

Gas passing per Hour, Cubic Feet.	—	Impurities in Gas per 100 Cubic Feet.			Temperature.		Pressure in Inches.	Revolution of Apparatus per Minute.	—	No. of Divisions and Strength of Liquor.										Water Used during Experiment. Gallons.
		SH_2	CO_2.	Grains. NH_3.	Washer.	Air.				10	9	8	7	6	5	4	3	2	1	
64,000 {	Inlet	2·00	2·00	158·8	72	57	21	4¼	Twaddel deg. at 60°	5·3	4·9	2·85	2·35	1·7	1·05	0·6	0·3	0·15	0·1	63
	Outlet	1·50	1·50	0·8	68	57	20		Acid, ounces.	11·0	8·4	6·3	4·5	2·7	1·7	1·3	0·7	0·3	—	

Messrs. KIRKHAM and HERSEY. *The Leeds Corporation Gas-Works, Meadow Lane, Aug. 14, 1879.*

Gentlemen,—In reply to your inquiry of yesterday's date, I have pleasure in stating that the item appearing as income derivable from Ammonia in my estimate of revenue for current year is not an exaggeration. Our average income from Ammonia is 2s. 8d. per ton of coals carbonized, but at the works where your invention is in use we derive not less than 3s. per ton. Since the introduction of efficient Scrubbers at our works the greater yield of this product (now twice as valuable as coke to us) is such that the cost of Apparatus for its extraction can be wholly paid for out of from nine to twelve months gains. I am, Gentlemen, yours faithfully, (Signed) H. WOODALL, Engineer.

Messrs. KIRKHAM and HERSEY. *Heywood Local Board Gas-Works, Hooley Bridge, Heywood, Dec. 1, 1879.*

Gentlemen,—In reply to your favour of the 28th ult., I beg to state that the Scrubber is at work, and doing well. I shall be glad to show it to any inquirers.—Yours truly, (Signed) EDWIN BUCKLEY, Engineer.

For further particulars and testimonials, address Messrs.

KIRKHAM, HULETT, & CHANDLER, LIMITED, 59 & 60, Palace Chambers, Bridge St., Westminster, London, S.W.

C. & W. WALKER'S
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Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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ESTABLISHED IN 1860.

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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GEORGE'S
Patent Gas Calorigen,
A STOVE FOR
WARMING AND VENTILATING.
RECOMMENDED BY DR. RICHARDSON.

MANUFACTURERS:
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FOR
GAS, WATER, & STEAM.

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BRADFORD, YORKSHIRE.

Gold Medal Awarded, Paris Exhibition, 1878.

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STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS, AND DIES, SPANNERS
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ANVILS, VICES,
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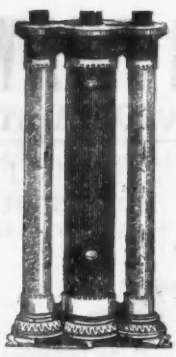

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Silver Medal awarded in 1878, at Wolverhampton Exhibition.

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No Flue.
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No Offensive Smell.
Light and Warmth combined.
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Messrs. RITCHIE & Co. are prepared to supply these Stoves on the best possible terms to Gas Companies to let out to their Consumers on the hire system.
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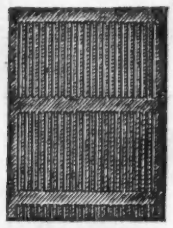
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On our approved principle, for the extraction of Ammonia.
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J. & J. BRADDOCK,
GLOBE METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET & DRY CONSUMERS GAS-METERS,
OF THE HIGHEST EXCELLENCE ONLY;
BRADDOCK'S PATENT COMPENSATING GAS-GOVERNORS;
ALSO LICENSEES AND MANUFACTURERS OF
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ROUND STATION-METERS,
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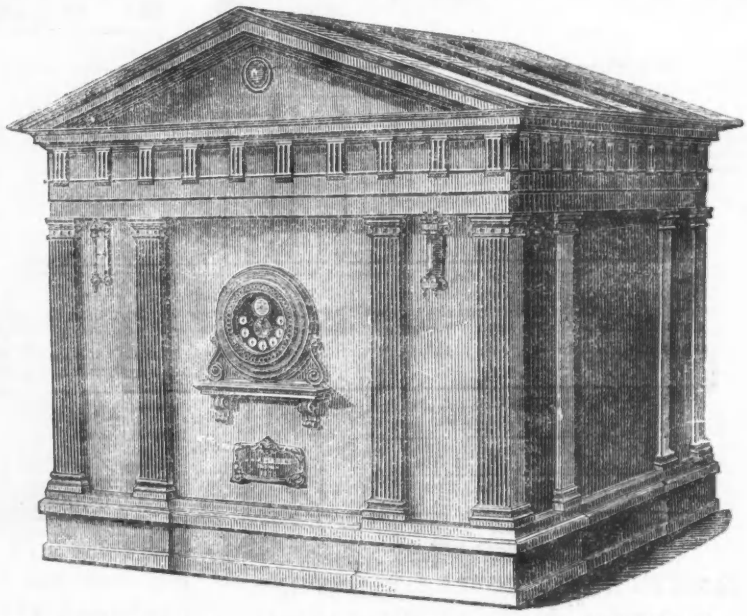

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WITH PLANED JOINTS.
GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.
GAS COOKING APPARATUS.
Home and Foreign Orders promptly attended to.
All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.
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TERMS, &c., ON APPLICATION.

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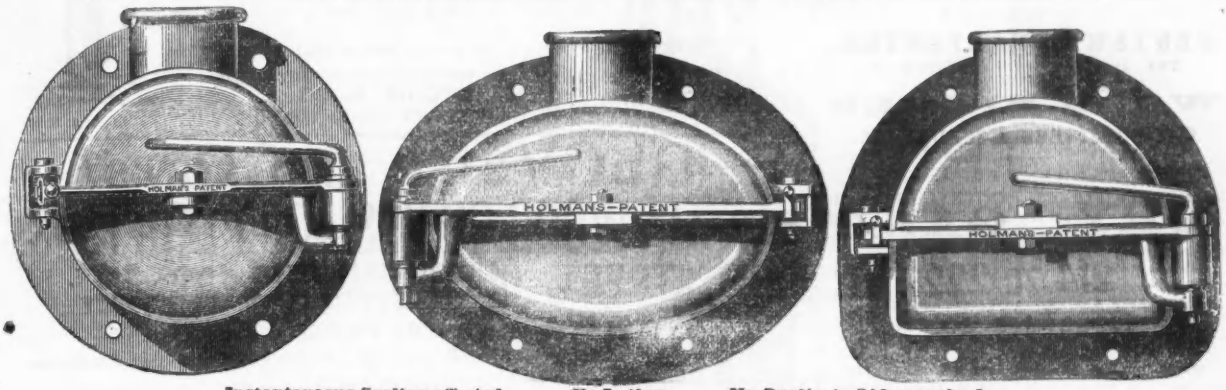
CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E.C.

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and Self-Sustaining Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Morton's Patent Retort-Lids are in use in nearly all the Principal Gas-Works in the United Kingdom and the Colonies; also on the Continent and in the United States of America. They are now made of the

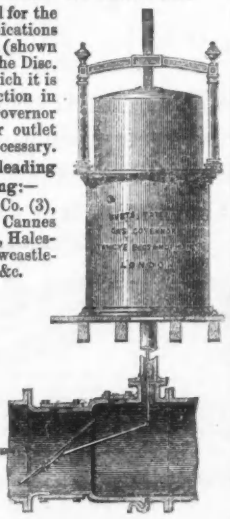
SAME FORM OR SECTION AS THE RETORT. (See Illustrations above.)

Engineers preparing Specifications of New Works will be furnished with Dimensions of Stock Patterns, together with Approximate Weight and other data on application.

HUNT'S

EQUILIBRIUM DIRECT-MAIN GAS GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight & Coke Co. (19), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Leicester, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

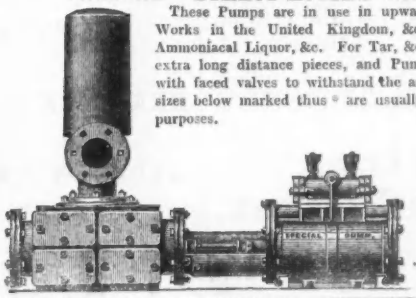
Yours truly,

(Signed) JOHN JOHNSON.

THE

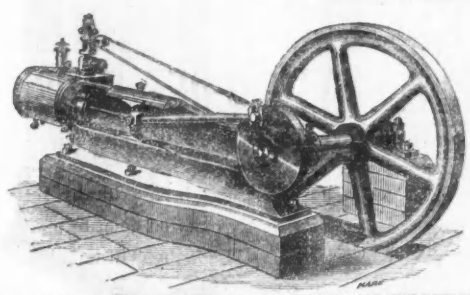
"SPECIAL" DIRECT-ACTING STEAM-PUMP.

These Pumps are in use in upwards of one hundred Gas-Works in the United Kingdom, &c., pumping Water, Tar, Ammoniacal Liquor, &c. For Tar, &c., they are provided with extra long distance pieces, and Pumps are entirely of iron, with faced valves to withstand the action of the liquid. The sizes below marked thus * are usually kept in stock for these purposes.



The quantities delivered of Tar should be taken about two-thirds that of water.

Diameter of Steam Cylndr.	Diameter of Water Cylndr.	Length of Stroke.	Gals. of Water per Hour, Approx.	Prices for Water.	Prices for Tar and Ammoniacal Liqr.
*3 in.	1½ in.	9 in.	450	£16 0 0	£17 0 0
*4 ,,	2 ,,	9 ,,	815	18 0 0	19 0 0
*5 ,,	2¼ ,,	12 ,,	1,250	21 0 0	22 10 0
*5 ,,	3 ,,	12 ,,	1,830	22 10 0	24 0 0
*6 ,,	3 ,,	12 ,,	1,830	25 0 0	26 10 0
*6 ,,	4 ,,	12 ,,	3,250	30 0 0	31 10 0
6 ,,	5 ,,	12 ,,	5,070	35 0 0	36 10 0
*7 ,,	5 ,,	12 ,,	5,070	40 0 0	41 10 0
7 ,,	6 ,,	12 ,,	7,330	45 0 0	46 10 0
*8 ,,	6 ,,	12 ,,	7,330	50 0 0	52 0 0
10 ,,	6 ,,	12 ,,	7,330	60 0 0	62 10 0
10 ,,	8 ,,	12 ,,	13,000	75 0 0	77 10 0



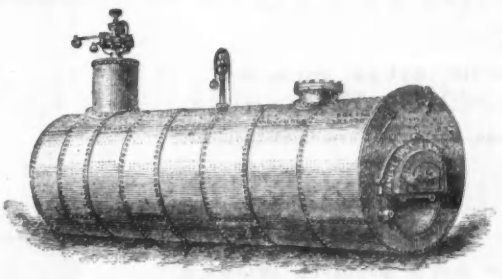
TANGYE'S HIGH-PRESSURE STEAM-ENGINE,

NEARLY 4000 IN USE.

The Design, Workmanship, and low prices of these Engines have called forth universal approval.

Nom. H.P.	2	3	4	6	8	10	12	14	20	25
	£28	£37	£44	£68	£86	£111	£122	£133	£185	£215

Including Governor and Feed Pump. Variable Expansion extra.



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This Department having been greatly extended and furnished with the most approved Boiler-making Machinery and Tools, T. B. & H. are prepared to supply all kinds of Steam-Boilers with great facility at lowest current prices.

Also Makers of IMPROVED HYDRAULIC HOISTS, TRAVELLERS, CRABS, CRANES, PULLEY BLOCKS, HYDRAULIC AND SCREW LIFTING JACKS, LATHES, PUNCHING AND SHEARING MACHINES, And all other Descriptions of Tools, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, &c., ON APPLICATION.

London, 1851. New York. 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

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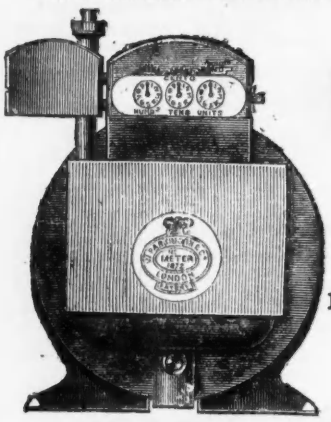
THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.



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WET & DRY METERS,

STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

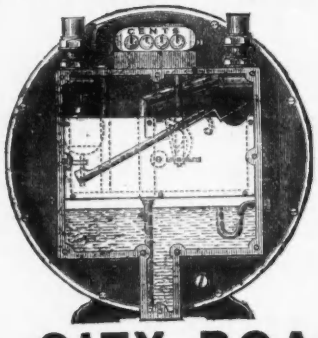
PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

SOLE AGENTS FOR

FOULGER'S PATENT SEAL UNIONS & CUTTING-OFF CAPS.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

A Country Manager.—*The process in question, being part of the necessary work of manufacturing the gas as sold, is, without doubt, embraced by the clause referred to.*

J. C.—*The Secretary of the City and Guilds of London Institute for the Advancement of Technical Education will furnish the information you require on application addressed to him at the Institute, Cowper Street, Finsbury.*

Alpha.—*When no mention of deposits from intending consumers is contained in their private Act, a Company can only demand security of the usual kind for payment of their account when due, and if this is offered they cannot refuse to supply gas, if their mains are laid sufficiently near to the applicant's premises.*

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 21, 1880.

Circular to Gas Companies.

Absolute secrecy is being maintained respecting the proposals received by the Streets Committee of the City Sewers Commission in reply to their invitation for tenders for lighting the principal thoroughfares of the City by electricity. We shall, however, be probably not far from the truth in stating that the competition for the favours of the City Authorities in the matter of street illumination was not so brisk among the various organizations for supplying electric lighting as might have been expected. If this should prove to be the case, and the scheme should consequently be curtailed or abandoned altogether, it will probably be owing principally to the grand scale on which the City Authorities wished to have their experiment carried out. They, perhaps, being accustomed to see any demand on the Gas Companies for more light, easily met by the simple expedient of turning on more gas from sources to them unseen and apparently inexhaustible, may be pardoned for believing that the substitution of one method of lighting a few miles of streets for another, was merely a question of arrangement of the details of apparatus, and that nothing would be easier than to "welcome the coming, speed the "parting guest." And their belief in the power of any known form of electric lighting to take the place of gas at any moment, and to any required extent, may have been fostered by the blatant advocates of the party in opposition, who are never backward in attributing the slowness with which the electric light is spreading, to anything but its own demerits, or the unreadiness of its purveyors. But it will not surprise those conversant with such matters, if it should transpire that most of the respectable Electric Light Companies find themselves unprepared to undertake more than a small, perchance a very small portion of the great work offered to them by the Sewers Commissioners. This eventuality would not at all deteriorate from the interest attaching to the experiment, provided that the competing parties are sufficiently numerous to make the exhibition important in the aggregate. There is one consolation which the Sewers Commissioners may lay to heart in case the Electric Light Companies do not come up to time. The gas they have always with them, and if they want to get up a show of how streets can be lighted when the will to pay for brilliancy exists, they cannot do better than follow our previously expressed counsel—to add to their earlier design the exhibition of the various improved methods of street illumination by gas, to some of which they are no strangers. If Electric Light Companies are backward, gas burner and lamp manufacturers are eminently the opposite, and any or all of them who have already distinguished themselves in the conflict of gas with electricity would, we are assured, be only too pleased to take a mile or so of streets and show what they can do in turning night into day. Such a course as that above indicated would, as we have already said, make the proposed experiment really valuable and very instructive, whether the whole of the scheduled streets are finally given up to the electric light or not. There are many other thoroughfares, in continuation of, or in contiguity to the streets named, in which a brilliant light would be quite as useful, and we venture to hope that the competition which the Sewers Commission have attempted to inaugurate in a somewhat one-sided manner, may be carried out at last on a fair and complete basis such as we have indicated.

The ordinary half-yearly meeting of the Crystal Palace District Gas Company passed off very harmoniously on Thursday last, the Directors having to report nothing but satisfactory progress in the business of the Company during the past six months. Full dividends were earned on all the stocks and shares of the Company, and the working results appear to have been maintained throughout the half year at a high pitch of perfection. This will be conceded when it is observed that although the Company's district is hilly, and the population widely scattered, the unaccounted-for gas is only 5½ per cent. of the total production. The Company hold a strong position financially, having ample capital powers, and we cannot but agree with the remarks of the Deputy-Chairman, Mr. H. P. Stephenson, on the wisdom, in their case, of being content with the maximum dividends they are now enabled to pay, without grasping after more. What the Company might or might not have obtained for an initial price under the sliding scale, if they had gone to Parliament some years back for that purpose, is now beside the question. They might or might not get better terms at the present day than those under which they contrive to exist so comfortably, but the fear of faring worse by going farther may well operate to induce them to be contented with the powers they possess.

The Bristol United Gas Company have had a successful half year's working, during which they have also been compelled to take measures for increasing the storeage capacity of their new works at Stapleton. The gross revenue of the Company has declined during the past six months, in consequence of a reduction in the price of gas having been made at the commencement of the year. Full dividends were declared at the ordinary meeting of the Company on Wednesday last, and the business of the current half year is expected to present a marked improvement over that of the period covered by the report just adopted by the Shareholders. The expenditure of capital at the new works necessitated the sale by auction of £20,000 of the Company's stock on the day following the meeting. Good prices were realized, the whole being disposed of at £179 to £181 per cent.

The process of forming a combination Company uniting the interests of the general public, the Local Board, and the

Aire and Calder Navigation Company, for supplying the town of Goole with gas and water, has advanced another step. The Local Board have instructed their Clerk to take the necessary steps, in conjunction with the Engineer of the Navigation Company, to draw up a draft Bill to embody the conditions of the preliminary agreement of which mention has been already made in these columns, and the proposed Bill will then be submitted to the Local Government Board for approval before further steps are taken. The future of the scheme therefore rests with the Central Authority, who will have to decide whether the rates can be drawn upon for supporting a kind of hybrid undertaking, having, moreover, a double character of which one portion will probably be less profitable than the other. The Local Board have not moved too soon, if they wish to get their Bill ready in time for next session. Local Government Board action is not particularly hasty under ordinary routine conditions, and with this unusual business to be settled their proceedings are likely to be more than usually deliberate.

We feel that the letter of Messrs. Beverley and Wylde on the subject of gas apparatus exhibitions, which appears in another column, is calculated to give our readers a somewhat painful impression respecting more than one of these exhibitions, and we regret that the necessity should have arisen for stating, on the authority of our correspondents, that these exhibitions, which were intended to instruct gas producers and consumers in the best means of using gas for purposes other than lighting, should have already been diverted to serve the purposes of a "ring" of manufacturers. It seems hardly credible that the promoters of these exhibitions, whose motives we may be sure have always been to provide the best possible show for the gratification and instruction of their local public, should have fallen so helplessly into the hands of an "association" self-charged with the regulation of such undertakings in their own interests, as appears from the communication in question. The promoters may have felt weak, and the "association" have been strong enough to impose, and insist on their own conditions. The eminence, or the contrary, of the members of a ring of this nature, and with these objects, does not affect the principle involved, which is the restriction to the few of advantages which should be open to all; in other words, the subjection to private ends of what should be devoted to the public good. The policy which dictates the formation and controls the operations of a "ring" is so false that it can never stand the light of public notice, which sooner or later it invariably attracts; and it, moreover, generally fails of its object. In cases like the one in point, it is difficult to see how manufacturers who are so jealous of competition that they try to exclude even the smallest suspicion of it, can be justified even from the narrow standpoint of their own interests. If their productions are worth anything they have no cause to be afraid of competitors, and if they are not, they might learn by those which excel them when placed side by side. We trust that this is the last time we shall be called on to notice a subject so unsavoury in itself and so out of joint with the free and open spirit of the time. We may add that rumours of the prevalence of practices such as are exposed by our correspondents have reached us indirectly from time to time, but too vaguely to be altogether relied on, or published with any useful effect. The positive statements now made in reference to this matter will probably warn the promoters of future exhibitions of gas apparatus to be on their guard, for no organization of this kind can exist if strongly and generally set at defiance.

The members of the South-West of England District Association of Gas Managers held their sixth half-yearly meeting at Southampton on the 14th inst., under the presidency of Mr. S. W. Durkin, Engineer and Manager of the Southampton Gas Company. There was no formal opening address, but the President, in a few remarks, called attention to the Employers Liability Act, and recommended every manager to study it very carefully. Respecting gas matters of local interest he announced the intention of the Directors of his Company to introduce Sugg's improved street-lamps into Southampton, by way of a lesson to the Local Authorities. An interesting paper on the extension of gas lighting was afterwards read by Mr. T. Stone, of Weymouth, in which the author gave an account of his experience in taking a lighting census of his district, with a view to increasing the number of his customers, an enterprise in which he seems to have been unsupported, and to have consequently abandoned. We fear that in too many places this disinclination to extend the supply of gas exists, and it is unfortunately an idea apt to work in many different ways, frequently resulting in disaster to those who follow its dictates most faithfully. Without going in all cases so far as Mr. Stone, and wishing to see Gas Companies carry on a "touting" business, we perfectly agree with the suggestion that all legitimate means should be taken to induce the masses of urban populations to regard gas as one of the simple commodities of their every-day life, as readily purchased and paid for, in their own way, as any other necessary of existence. Mr. N. H. Humphrys, of Westbury, also read a paper, "On Lime for Purifying Gas," which contained some hints and suggestions useful to gas managers in testing lime intended for purification.

A further contribution to modern information upon the subject of gas condensation appears in another column, as a translation of a paper read by Mons. F. Cadel at the last meeting in Paris of the Société Technique de l'Industrie du Gaz en France. The author appears to have been in search of a method of condensation which should avoid risk of deterioration of the illuminating power of gas by the contact of heavy tar, and yet provide for the absorption of naphthaline from the gas by tar before it is removed. A perusal of the paper will show the difficulties experienced by the author in the course of his researches, and also the means finally adopted by him to obtain the required results. It is interesting to notice how closely Mons. Cadel approaches the line of reasoning and observations of Mr. Somerville, in the communication on condensation as practised at the South Metropolitan Gas-Works, read by him before the members of the British Association of Gas Managers in June last. The two arrangements are sufficiently distinct, but on such parity of reasoning it would not have been surprising if they had been much more alike. Mr. Leicester Greville has also been working on the same lines, and has contributed largely, in his recent articles published in the JOURNAL, to the settlement of the question of the relation of the so-called tarry vapours to the illuminating power of gas, and the same subject has also been investigated in Germany; so that any mystery still surrounding the action of gas condensers should not long remain undispelled, now that so many inquirers are giving the matter such careful attention.

THE Owners of the Birtley Iron-Works and Pelaw Main Collieries have given notice of the removal of their London Offices from 101 to 46, Cannon Street.

SALE OF STOCK IN THE BRISTOL UNITED GASLIGHT COMPANY.—On Thursday last Messrs. H. R. Fargus and Co., of Bristol, sold by auction £20,000 worth of capital stock in the Bristol United Gaslight Company. The stock was offered in lots of £100 each, and the whole of it was sold at from £179 to £181 per cent.

DEATH OF MR. WILLIAM HASELDINE PEPYS.—The number of English engineers who have settled on the Continent, and become famous there, has been diminished by the death, on the 4th ult., of Mr. Wm. Haseldine Pepys, late of the Cologne Gas-Works. Mr. Pepys was born in London on Christmas-day, 1817, and in his sixteenth year went to Berlin in connection with the then newly-established Imperial Continental Gas Association. In 1838 he built the gas-works at Ghent; and in 1844 became Engineer of the Cologne Gas-Works, from which position he retired in 1876.

THE LATE MR. EVANS.—The *Illustrated London News* says: "The will (dated Feb. 16, 1878) with a codicil (dated April 22, 1879) of Mr. Frederick John Evans, late of Clayponds, Brentford, Middlesex, who died on July 8 last, was proved on the 20th ult. by Mrs. Cecilia Anne Evans, the widow and acting executrix, the personal estate being sworn under £35,000. The testator bequeaths to his wife £1000 and an annuity of £1000, and certain of his furniture, plate, and effects for life; to his niece and adopted daughter, Minna Fanny Cecilia Evans, an annuity of £100 during his wife's lifetime, and at her death such a sum is to be set apart upon trust for his said niece as will produce £800 per annum; to his sister-in-law, Mrs. Amelia Miller, an annuity of £200; annuities to nieces and other legacies. As to the residue of his property, the income is to go to his wife for life, and at her death the capital between some of his nephews and nieces."

THE GAS APPARATUS EXHIBITION AT BELFAST.—With reference to the exhibition of gas apparatus which was held in the Grain Market, Belfast, from the 17th to the 28th ult., we understand that it was a great success. Gas appliances for heating and cooking purposes were quite a novelty in Belfast, and although the public did not patronize very extensively the larger sizes, we are informed that they showed their appreciation of the advantages of gas for cooking purposes by purchasing freely of the medium and smaller sized ranges. The attendance over the eleven days during which the exhibition was open amounted to upwards of 8000, of which over 5000 were by payment of 6d., and it is believed that if the exhibition could have been kept open another week, the attendance would have very largely increased, as the Belfast public were only beginning to take a real interest in the subject during the last week. The whole of the arrangements were under the superintendence of Mr. J. Stelfox, the Engineer and Manager of the Corporation Gas-Works.

CARDIFF GAS COMPANY.—The eighty-seventh half-yearly meeting of this Company was held on Tuesday, the 7th inst.—Mr. G. Phillips in the chair. The report of the Directors, and statement of accounts for the half year ending June 30 last, which were presented, were taken as read, and the Chairman, in moving their adoption, stated that a new holder and other extensions at the Grange works were in progress. These were necessary to meet the increasing demand for gas, while the Directors had under consideration a reduction in the price charged to consumers. The present price is 2s. 10d. to 3s. per 1000 cubic feet, and the illuminating power, as tested by Sugg's "London" Argand burner, is 16 candles. Dividends at the rate of 10 per cent. per annum on the "A" stock, 8 per cent. on the "B" stock, and 7 per cent. on the paid-up capital created by the Act of 1870, were declared. The thanks of the meeting were voted to Mr. Bowen, the Engineer and Managing Director, and also to the Chairman and Directors, for their attention to the interests of the Company.

Water and Sanitary Notes.

THE Registrar-General reports, upon the authority of Dr. Frankland, that "all the samples of Thames water supplied "to the Metropolis during August were of very bad quality, "and were quite unfit for dietetic purposes, owing to their "pollution with organic impurity." The Lea water is described as not much better. "A Surgeon," influenced by this recital, writes to the *Standard* proposing that the Water Companies should be "prosecuted for supplying what is "injurious to health." The *Evening Standard*, commenting on Dr. Frankland's condemnation of the supply, observes: "It is some consolation to find that the Registrar-General "reports that during the month when, as Dr. Frankland "states, all the water supplied was of very bad quality, and "quite unfit for drinking purposes, the inhabitants of the "Metropolis were nevertheless in an exceptionally excellent "state of health, the mortality being lower than it has been "for more than a year." In the report issued under date of the 13th inst., we find the Registrar-General saying with regard to London: "The annual death-rate from all causes, "which had steadily declined in the six preceding weeks "from 24·9 to 20·8, further fell last week to 19·8, a lower "rate than has prevailed in any week since the beginning of "July." Looking down the list of twenty large towns in the United Kingdom, we find that the death-rate in respect to zymotic diseases is lowest of all in London, and the death-rate from all causes is lower in London than anywhere except Bristol. London has a zymotic mortality for the week of only 4·8 per thousand per annum, while Brighton has 8·8, together with a mortality from all causes of 31·6. Yet Londoners go to Brighton for health! The zymotic death-rate at Wolverhampton is 13; at Norwich, 14·6; at Liverpool the same; at Leicester, 21·7; and at Salford, 22·7. The *Evening Standard* discreetly observes: "It may be concluded "that, unpleasant as it may be to drink water teeming with "organic impurity, yet that this fluid is not, after all, so "deadly a poison as our scientific friends would wish us "to believe." Some pertinent remarks on the effect of neglected house-cisterns on the water supply occur in a letter addressed to *The Times* last week by Mr. Bernard Dyer.

From the complaints which are made in the Paris papers as to the presence of ill odours in that city, we are led to conclude that the drainage of the French metropolis is not altogether superior to that of the British capital. Possibly the French arrangements are not complete, but if the incompleteness chiefly refers to the final disposal of the sewage, we hardly understand why bad smells should prevail in Paris itself. Within and without, Paris appears to be troubled. According to one account, "the gutters smell, the sewers "under repair smell, and the evening breeze brings with it "insupportable odours from certain establishments situated "in the outskirts of the capital." A ramble on the Boulevards fails to secure the enjoyment of fresh air, the atmosphere being "contaminated by pestilential exhalations." Paris has a large area under sewage irrigation in the fields of Gennevilliers, and this it is proposed to extend still further. It is not explained whether the offensive "establish-"ments" are in any case connected with the sewage works. Possibly they are of the nature of those factories which are crowded together in the region known as "London over the "border." But if the present complaints as to the sanitary condition of Paris are well founded, it does not seem that we have much to learn from our French neighbours in regard to urban sanitation, especially when we consider the far greater volume of the London sewage as compared with that of Paris, and the enormous extent of the manufacturing interest on the borders of the British metropolis. London has, however, one advantage in the magnitude of the river which flows through it. If the Thames in London were no bigger than the Seine in Paris, the sewage question in our own case would be much more serious than it is. Could we only get rid of our smoke, London, adorned as it is with a continually improving architecture, and with many new embellishments, would begin to challenge comparison with its elegant competitor. For the present, we must be content to plead the superior healthfulness of London among the cities of the world. Thus, according to the latest returns, we find Paris having a death-rate of 26 per thousand, while that of London is 21 only. Some of the offensive odours with which the Parisians are annoyed are alleged to arise from the house drains, which the landlords are allowed to neglect to an extent certainly not permitted here.

Leicester, when its water-works were first established, had a population of about 60,000. The number has since risen to 130,000, and is still increasing. The water supply has been enlarged during this period from 1,600,000 gallons per day to 3,000,000, the present quantity being rather more than 23 gallons per head per day. The Corporation, to whom the works now belong, have just completed a new filter-bed, which was opened with some ceremony one day last week. Another filter-bed is in course of construction, and the cost of the two is estimated at about £8000. The old filter-beds are four in number. The surrounding villages drawing upon Leicester for their supply of water, enhances the necessity for enlarging the works, and the demand is said to be growing very rapidly. The works were set on foot by a Company; but after a while the Corporation "assisted" the Company by taking a certain number of shares. These proved to be a good investment, and ultimately the Corporation purchased the entire undertaking. The result is that they are reaping a profit, and are looking for a handsome balance on the next account, which will go to the credit of the borough. By this we understand that a certain portion of the water-rates will take the place of a corresponding amount in the other rates. We regret to observe that Leicester has lately suffered from an extraordinary outbreak of diarrhœa. In five weeks the deaths from this disease have been as many as 212, and the total mortality in the week ending on the 11th inst. exceeded the births by ten. The epidemic is partly attributed to the disastrous floods which took place nearly two months ago, followed by very hot weather.

The new sewage farm at Horsham is accused of polluting the River Arun, and the subject has been brought before the Rural Sanitary Authority by the district Medical Officer of Health. The water of the river for some distance west of the town is described as a black, thick, offensive fluid, fatal to fish life, and exhaling dangerous gases, prejudicial to the public health. In the tributaries where the mill-wheels agitate the stream the stench is described as unbearable. Moved by this report, the Board of Guardians have decided to co-operate with the Horsham Local Board in steps to be taken for remedying the evil. It would seem that the Arun must have very little water, or else that the sewage farm is a very poor affair. The pollution could scarcely be worse if the sewage went in raw.

AT last week's meeting of the Liverpool Town Council, a proposal was made to pay to the Water Engineer a sum of £400 on account of extraordinary expenses he had been put to in connection with the passing of the Corporation's Water Bill during the past session of Parliament. Great opposition was evinced to the recommendation to that effect of the Water Committee; and eventually it was negatived by 28 votes to 15. A discussion then took place as to the proposal, mentioned in a recent number of the JOURNAL, to grant £1500 to the Town Clerk as an honorarium for his services on the same occasion. This recommendation was, at the request of the Town Clerk himself, subsequently withdrawn.

IT is announced that, at the Edinburgh meeting (next month) of the Social Science Congress, among the papers to be then read in the Health Department is one by Dr. Stevenson Macadam, entitled "What are the means which should be adopted for the prevention of the pollution of streams without undue interference with industrial operations, and for the preservation of pure sources of water supply?" Professor Jenkin will read a paper on the following question:—"What is the best mode of amending the present laws with reference to existing buildings, and also of improving their sanitary condition so as to render them more healthy, having due regard to economical considerations?" Sheriff Spens, of Glasgow, in the same department will raise a discussion on the question: "What are the best areas for sanitary purposes, and how far should there be a revision of the mode of electing and continuing the services of the officers under the Public Health Acts?"

BODMIN WATER COMPANY.—The twenty-eighth half-yearly meeting of this Company was held on the 31st ult.—Mr. Cardell in the chair. The report of the Directors, which was presented, stated that the expenses had been much heavier than usual, consequent upon the low state of the river; and the profit and loss account, therefore, showed a loss on the half year's working. The Chairman, in moving the adoption of the report, said he thought that, in ordinary seasons, the Shareholders might expect a small dividend year by year. The report was adopted, and a vote of thanks passed to the Chairman and Directors for their services.

LYNTON WATER COMPANY.—The annual meeting of this Company was held on the 23rd ult.—Mr. J. P. Ffinch in the chair. The Directors, in their report, referred to the continued prosperity of the Company, and stated that the works were all in good condition. The revenue had again increased, and this might, they said, be fairly looked forward to in future years, as the growing prosperity of Lynton must be reflected on the Company. There was a balance of £148 11s. 7d. in the banker's hands, out of which the Directors recommended a dividend of 7s. per share, being at the rate of 7 per cent., leaving a balance of £22 11s. 7d. to be carried forward to the next account. The report was adopted, and the proceedings terminated.

DROGHEDA WATER COMPANY.—The annual general meeting of this Company was held on the 31st ult.—the Mayor (Alderman Chadwick) presiding. The Directors, in their report, which was presented, stated that there had been an increase in the rental over that received in the previous year, and the reservoirs and pipes were all in good order. The Drogheda Corporation had been making inquiries as to the terms upon which the Company's works would be sold to them; but as no definite offer had been made, the Directors considered it unnecessary to further refer to the matter. The statement of accounts showed a balance of £495 7s. 11d. to the credit of profit and loss account, but as a sum of about £200 had to be provided for, the Directors could not recommend a higher dividend than 2 per cent. Alderman Daly moved the adoption of the report, and the motion was carried unanimously. The retiring Directors and Auditors were re-elected, and the proceedings closed.

Notes.

[*This column is intended to contain miscellaneous memoranda on topics of general professional interest to our readers. We shall be glad to receive for insertion in it any scraps of information, observations of facts, or descriptions of apparatus, &c., which may be worth publication, and yet may not be considered suitable for our "Correspondence" column.*]

The Elemental Manufacture of Ammonia.

Many attempts have been made to utilize the nitrogen of the atmosphere on a commercial scale, but hitherto with little success. Among all the commercially valuable nitrogenous compounds, ammonia has long been considered the most promising of successful synthesis from its elements as they exist in air and water. But, either from defects of method or apparatus, or both, the production of ammonia from the union of atmospheric nitrogen with nascent hydrogen from the decomposition of steam, although quite possible, has not yet become a regular industry, and the ammonia of commerce has still been most largely obtained from gas liquor. According to the *Chemical Review* for the current month, a process—differing in some respects from Mr. Rickman's earlier invention, which we noticed in the JOURNAL in the spring of this year—has, however, been discovered by Messrs. Rickman and Thompson, which is capable of producing ammonia from air and water, with only one intermediate step. The principal difficulty met with in the endeavour to make ammonia from its elements has been the narrow margin existing between the temperatures of its formation and decomposition. Steam only decomposes at a full red heat, while a bright red will decompose the ammonia which is formed at the lower temperature, and therefore the margin in which it is alone capable of existence immediately after formation is too narrow to be relied on in practice. The new process gets over this difficulty by causing the formation, at first, of ammonium chloride—a compound which sublimes at high temperatures, but does not decompose. The apparatus employed consists of an ordinary close furnace provided with means of controlling the supply of air to the fire, which is maintained with small coal mixed with 5 to 8 per cent. of common salt. The chlorides of sodium and calcium decompose in presence of nascent ammonia, and one of these is therefore chosen. The steam required is produced by the waste heat of the same fire. Ammonium chloride is thus formed at a full red heat without risk of loss by accidental rise of temperature. In use, 20 to 28 lbs. of coal dust and salt per hour produce 2 to 3 lbs. of ammonium chloride, and from the simplicity of the necessary plant and the cheapness of the materials, the process is expected to be very economical.

Gas-Flames.

M. Neyreneuf describes in the *Journal de Physique* for August some experiments made by him with gas-flames. Two flames at the ends of tubes of unequal length, standing on an atmospheric reservoir, were observed to be differently affected when the pressure of gas was reduced, the lower flame being sooner affected thereby. The lower flame will go out or fire back, according to the size of the orifice, while the other remains burning, until it will even become reduced in power while burning by the addition of air entering by the shorter tube. With a Y-tube burner a similar effect may be observed if the pressure is sufficiently reduced, when the slightest inequality in height of the top edges of the tubes will be betrayed by the consequent difference in the flames. The same effect is also noticeable with a single tube. If a white flame be produced with an ordinary Bunsen burner and the cock gradually turned off, at a certain moment the flame will divide, the outer portion will be lengthened and become slightly paler, while the inner will turn backwards and heat the burner as though it were on fire internally. This divided flame is also sensitive. A Bunsen flame may also be made sensitive by making it horizontal, and it will be sufficient to reduce the pressure to that required to straighten it. With a tube several décimètres long, having a lateral opening at its base, the draught of air can be made to strengthen as the gas pressure becomes feeble. A flame from a thinned-out orifice gives a low sound when disposed horizontally. Two inclined flames if made to strike against each other will give a very perceptible sharp sound. All these experiments were made with gas at the ordinary pressures as for consumption for illuminating purposes.

The Existence of Matter in the Liquid State.

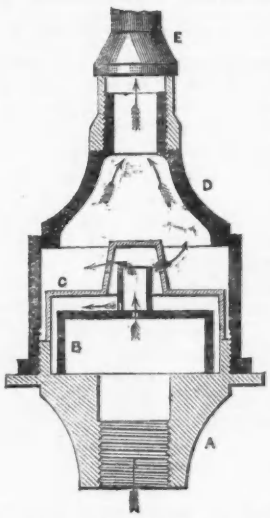
Professor Carnelley, of Firth College, Sheffield, communicated to a recent number of the *Chemical News* an account of experiments conducted by him with reference to the determination of the conditions necessary for the existence of matter in the liquid state. He concludes that (1) in order to convert a gas into a liquid the *temperature* must be *below* a certain point (termed by Andrews the *critical temperature* of the substance), otherwise no amount of pressure is capable of liquefying the gas; and (2) in order to liquefy a solid, the *pressure* must be *above* a certain point, which Professor Carnelley proposes to call the *critical pressure* of the substance, otherwise no amount of heat will melt the substance. As a consequence of the second of these propositions, it follows that if the pressure on any substance can be kept below its critical point, the melting point of a solid under ordinary conditions can be largely exceeded without liquefying it. Hence, for example, it should be possible to obtain such an anomaly as red-hot ice, and this is, in point of fact, what Professor Carnelley has succeeded in doing; or, at least, he has managed, by keeping the superincumbent pressure below 4·6 mm. of mercury—*i.e.*, the tension of aqueous vapour at the freezing point of water—to keep ice for a long time so hot that it could not be touched without burning the hand. After this, molten iron at a freezing temperature will perhaps become a common spectacle, and icy sunbeams will scarcely afford very great scope for wonderment.

The Lighting of Paris.

The Municipal Authorities of Paris, in unison with the Gas and Electrical Lighting Companies, are, says *Galignani*, studying all sorts of plans for improving the illumination of the city. Large contracts are being signed for candelabras in cast-iron and bronze, for *lanterne-bouquets* (as the clusters of lamps on the street refuges are euphoniously called) and all their appurtenances; and very shortly, no doubt, Paris will be, if it is not already, the best-lighted city in the world. The history of street illumination in the French metropolis presents a fair specimen of how that type of civilization has progressed since the Middle Ages. Public street lamps or lanterns made their first appearance in Paris in the sixteenth century, though they were then but few in number, and by no means perfect in themselves, street lighting being greatly improved by Mons. De la Reynie, an officer of the police, during the reign of Louis XIV. To judge from contemporary accounts, the street lamps of the seventeenth and eighteenth centuries must have given a very picturesque appearance to the public promenades, such as the Cours-la-Reine and quays, along which they were placed. The invention of *réverbères* or reflecting apparatus dates from a hundred years or so back, and with its reflectors, oilpots, weights and counterweights the first *réverbère* must have been a rather complicated affair. Improvements were introduced by degrees, and reflectors were only dethroned at last, after a severe struggle, by gas.

A New Street-Lamp Regulator.

Mr. Sugg, of Westminster, has lately perfected a compact and simple form of regulator for street and other gas-lamps, of the construction shown in the accompanying illustration. The body of the regulator, A, is made in brass or soft metal. Gas entering from below raises a bell of steatite, B, furnished at the top with a small tube open at its upper end, and pierced with a small hole just above the bell. The bell fits loosely into its seat, and is covered with a metal cap, C, of similar shape, with two holes in the side of its upper tube, which is closed at the top. The whole is covered with the outer case, D, from which a tube, E, leads to the burner. The course of the currents of gas is shown by the arrows in the engraving. The steatite bell, which is not liable to set fast or get foul in use, is weighted to the required pressure, and when this is exceeded it rises, and the top tube serves as a valve to cut off the outlet holes in the inner cap. The regulators are of substantial construction, and appear to answer their purpose admirably at any inlet pressure from 5-10ths to 6 inches, while they are much less cumbersome than the diaphragm street-lamp governors in common use.



Railway Carriage Lighting in Germany.

From reports recently obtained from the various German railway authorities it appears that the present state of the lighting of carriages is as follows:—For lighting material, rape-seed oil, gas, and, to a considerable extent, even candles, are used. Of some 16,168 carriages adapted for illumination, 10,968 (or 67·8 per cent.) are lit with rape-seed oil, 2653 (or 16·4 per cent.) with gas, and 2247 (or 15·8 per cent.) with candles. In addition, experiments have been made on some lines with the so-called Möhring oil, which is a mixture of petroleum and rape-seed oil. The gas used is partly made in works belonging to the railway, from fat, paraffin, petroleum, gas oil, or coal tar oil, partly obtained from gas-works. The holders, in which gas can be compressed to 5½ or 6 atmospheres, are fixed under the carriages, and connected with the burners by means of tubes with pressure regulators and valves. The filling of the holders is accomplished either direct from the gas-works by means of caoutchouc tubes, or through transportable reservoirs, which can be filled with 5 or 6 cubic mètres of gas pressed to 10 atmospheres, or from small vessels. A single filling of a holder suffices for 30, 40, or even 60 hours burning. The average cost given by the authorities, per flame and hour of burning, varies in the case of gas between 2 and 3·37 pfennige; in the case of oil, between 0·667 and 7·5 pfennige; and in the case of candles, between 1·8 and 6 pfennige.

BROADSTAIRS GAS AND WATER SUPPLY.—At the meeting of the Broadstairs Local Board on the 6th inst., Mr. Kidd gave notice of motion to make overtures to the Gas and Water Companies supplying that place, with the view of the Board purchasing their undertakings.

CASTLEBAR GAS COMPANY.—The sixteenth annual report of this Company recently issued, states that the receipts from all sources amounted in the past year to £728 2s. 1d. and the expenditure to £576 10s. 11d., leaving a balance of £152 1s. 2d. From this it was recommended to pay the usual dividend of 5 per cent. upon the paid-up capital of the Company, and carry forward the balance to next account. Since last year the price of gas has been reduced to 6s. 8d. per 1000 cubic feet, and this has involved a deficiency in the receipts to the extent of £50 17s. 7d., as against the previous year.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

GAS APPARATUS EXHIBITIONS.

A Strange Combination.

Sir,—In the interests of fair play, to which your columns have always been open, we desire to present a brief narrative of facts in connection with the "Gas Apparatus Exhibition" now being held in Dublin.

In response to the advertisement of the promoters, inviting communications from intending exhibitors, we promptly sent in a written application for space to show our "Leeds" patent and other gas cooking stoves. After waiting about a fortnight for a reply, we received a note expressing regret that there was "not space" available for our goods. Having been amongst the earliest applicants, we were surprised at this intimation; and wrote asking for an explanation. In reply to this inquiry, the Secretary shifted his ground; and, no longer alleging want of space, simply informed us that he had "committed all the arrangements to an association of cooking apparatus makers!" adding that he trusted this would "explain the situation." This strange disclosure did explain the situation, but in a manner which must be condemned by all who appreciate the manifold advantages of free and unrestricted competition.

What are the nature and objects of the so-called "association"? It consists of Messrs. Leoni and Co., of London; John Wright and Co., of Birmingham; Billing and Co., of London; Hassall and Singleton, of Birmingham; Davis and Co., of Bath; and C. Wilson, of Leeds. The secrecy of their proceedings is confirmed in a note, which we extracted from the first-named firm, to the effect that their meeting was strictly private. In a subsequent conversation with a member of this clique the true purpose of their combination transpired. It was to the effect that they wished to keep all the gas apparatus exhibitions in their own hands; and it is perhaps natural that, apprehensive of being beaten in the race, they should unite their energies to exclude dangerous rivals.

What will most surprise your readers is that a public Gas Company in Dublin, professing to exhibit all the best means of using gas other than for illuminating purposes, should have been induced to play directly into the hand of a small clique of manufacturers and traders, whose sole object is to protect and promote their own interests. Impressed with the extreme unfairness of such an exclusive policy, we wrote in a tone of remonstrance to the Secretary of the Dublin Exhibition; and, on the 21st of August, received a reply, stating that if we had any special or novel apparatus in economy, price, or construction, they would be glad to exhibit them. In the preliminary advertisement inviting applications for space there was no stipulation whatever as to novelty, and if this condition had been pressed in the case of the associated firms it would have excluded them from the exhibition. Under these circumstances it was a palpable subterfuge to insist upon novelty as a *sine quâ non* in our case; but we were, nevertheless, prepared to accept the new condition, and sent a stove which had not been exhibited previously. Anxious to secure a "fair field and no favour," our Mr. Wylde went to the expense and trouble of twice visiting Dublin, where one of the Gas Company's responsible officers said that, although dissatisfied with the course adopted by the "association," the promoters of the exhibition felt bound to abide by the arrangements. He added that, nevertheless, an effort would be made to let our firm have space. After further communication by letter and telegram, the result is that, instead of being allowed adequate space to show our goods, we are tardily allowed to show only one stove, and this, as before stated, was closely restricted to a novelty.

It is certainly not by such management as we have described that gas apparatus exhibitions can be made most effectively to serve their useful purpose; but surely promoters of such exhibitions ought in future to beware of "committing all the arrangements" to an association of exhibitors, who take advantage of their opportunities to exclude their more successful competitors.

Lest it should be supposed by any that this is only a personal grievance, let us add that other respectable and enterprising firms in the same line of business have been similarly dealt with. We do not think that this trades-union will exist after exposure in your columns, and we therefore ask you to insert this letter.

Leeds, Sept. 17, 1880. Beverley and Wylde.

THE EFFECT OF FROST ON GAS APPARATUS.

Sir,—In the Journal of the 7th inst., I observe there is a report of the last meeting of the North British Association of Gas Managers. In that report reference is made to a paper by Mr. Whimster, of Perth, in which there is a remark on an apparatus to prevent the water in gasholder-tanks from freezing. His remarks, however, on this subject appear to have been passed over unnoticed. I think this is a pity, as they were perhaps the most valuable he made—remarks calculated to aid gas managers in contending with the difficulties which have to be encountered in keen frosty weather, especially in regard to the freezing of their gasholder-tanks.

At the meeting of the North British Association held in Edinburgh last year (see Journal, Vol. XXXIV., p. 181), Mr. Whimster referred wholly to the use of exhaust steam. But the arrangements referred to in the latter portion of his latest paper—as to connecting the gasholder-tanks by pipes to a cistern over the retort-bench, or, it may be, over flues at the ground-level to the chimney, or by a special boiler and fire expressly built for the purpose, to supply one or more tanks—are the inventions of, or arrangements designed by Mr. Key, and, therefore, in all fairness should not have been made public, I think, without being coupled with that gentleman's name. We have already seen how difficulties and differences of opinion in after-years so easily arise, in consequence of the thoughtlessness of some parties who, while reading a paper, make use of the ideas or inventions of another, without mentioning the name of the author or inventor. Now, unless the wrong impressions thus conveyed are at once corrected through the medium of your Journal, the effects might be very serious.

It is now three years since Mr. Key, in a conversation with me, suggested the placing of a cistern, to be heated by my main flues, to prevent the gasholder-tank from freezing—the cold water circulating from the tank to the cistern, and the hot water from the cistern to the tank. In his letter on this subject in the Journal of the 19th of August last year, Mr. Key provided for the heating of the lute of a telescoped holder when full of gas; but in working his system throughout last winter he found it quite unnecessary, as the temperature of the surface of the water in the gasholder-tank was easily kept at 120° Fahr., if desired; and when the holder "cupped," taking warm water with the lute, and by evaporation and radiation the holder plates were kept warm when the thermometer was at 19° Fahr. within 3 yards of the tank. After working his arrangement for some time, it was secured by provisional protection, merely, I understand, to prevent a repetition of such correspondence as occurred relative to his design for an hydraulic main overflow. The plan Mr. Key now works upon is that of having valvular openings at different depths in the suction-pipe, going to nearly the bottom of the tank, whereby he can draw from the bottom or at any desired depth, and thereby heat up a stratum of water over the entire surface of the tank of any desired number of feet in depth. This is to counteract the injurious effect of frost on the gas, by preventing the frost affecting the gas through the crown of the holder.

I concur with Mr. Whimster in thinking the arrangement worthy of notice, but venture to go further than he, and to say it is not only for the small gas-works he speaks of, but, as in Mr. Key's case, where it is applied to a holder capable of storing 1,500,000 cubic feet of gas, is also applicable to large works; and I understand a large gas-works in Scotland will have the holders fitted up with his arrangement on a large scale this next winter. James Black.

Gas-Works, Old Kilpatrick, Dumbartonshire, Sept. 10, 1880.

GAS COOKING OVENS AND TESTIMONIALS.

Sir,—I last year gave a testimonial to the makers of a certain gas cooking oven, beginning thus: "Without wishing to depreciate any other gas cooking ovens, I regard yours in construction, and in utilizing all the heat given off by the gas, as 'amongst' the most economical and efficient in the market." Whereas, by omitting the word "amongst," when printing it, my testimonial is made to read that I regard the oven in question "as *the* most economical and efficient in the market." Now in justice to myself, and to other makers of gas cookers, I wish to set myself right. This I shall do as gently as possible, and shall not give the names of the makers referred to, because, if even the omission in this case is not a printer's error, I believe upon the ground of trade morality very few could afford to "throw the first stone." At the same time without pretending to be a saint myself, testimonials ought to be at least true, and a guide in business. But, unfortunately, in this "diamond-cut-diamond" age they are fast approaching the mere level of Pindar's razors—"made for sale;" and I am afraid, if this sort of thing is allowed to go on, the integrity of business will soon be "whittled away to nothing." Chas. Sellers.

Gas-Works, York, Sept. 10, 1880.

St. Andrews Gas Company.—The forty-sixth annual meeting of this Company was held on Friday, the 10th inst., when the accounts for the year ending the 30th ult., which were presented, showed that the net income from gas and meter rents amounted to £3259 19s. 10½d.; added to this, £154 6s. 7d. had been received for public and other lamps; coke and tar had brought £200 16s. 1d.; interest, £8 13s. 3d.—total, £3623 15s. 9½d. There had been expended on coal and cartage, £1509 14s. 3½d.; lime, £55 5s. 8d.; retorts, £40 8s.; repairs and renewals, £366 4s. 8d.; salary and wages, £466 9s. 8d.; rents, £89 14s. 7d.; miscellaneous, £55 13s. 4d.—total, £2583 10s. 2½d., which deducted from the income left a balance of £1040 5s. 7d. The gas supplied is of the illuminating power of 26 candles, and it is charged at the rate of 4s. 7d. per 1000 cubic feet. The quantity supplied by meter during the past year was 16,811,900 feet.

Ackworth, Featherstone, Purston, and Sharlston Gas Company.—This Company held their half-yearly meeting on Tuesday, the 7th inst.—Mr. A. Wardman presiding. The Secretary (Mr. Watson) read the notice convening the meeting, also the balance-sheet, which compared favourably with the corresponding half of last year. The Directors report showed that considerable improvements and extensions had been carried out during the past six months, one of the gasholders having been repaired, two new purifiers erected, and improvements effected in the retort-house. There was now plenty of storeage room for gas, and four purifiers; the works were in good working order, and the Company were in a position to meet all the requirements of the coming season. The leakage had been reduced from 30 to 15 per cent. The report and balance-sheet were adopted. The Chairman proposed the payment of a dividend of 2½ per cent., which was carried unanimously. All the Directors were re-elected, and the Chairman, in thanking the Shareholders for their confidence, said they would always try to do their best for the Company. The Shareholders were informed that the Gas Bill had passed successfully through both Houses of Parliament, had received the Royal Assent on the 2nd of August, and came into operation on the 1st of the present month. A vote of thanks to the Chairman, Directors, and Officers terminated the meeting.

Oldham Corporation Gas and Water Supply.—At the meeting of the Oldham Corporation Gas Committee on the 8th inst., reference was made to the subject of reducing the price of the gas in the out-townships. The Chairman (Alderman Wainwright) explained that according to the new Borough Improvement Act the Gas Committee would not be able to charge as much for gas in the out-districts, as compared with the Oldham price, as they had been in the habit of doing, and it would be necessary to reduce the price charged in those districts 2d. per 1000 feet, to bring it in accordance with the scale allowed by the new Act. At the same time the Water Committee had resolved to give notice of an increase in the price of water, to take effect on the 25th of December next. They had to give three months notice of this increase, which would be 1 per cent. on the rack-rent. Hitherto the out-townships had had water at the same price as the Oldham consumers, but in future they would have to pay 1 per cent. more. The notice of the increase would be put on the September accounts, and it had been suggested that an intimation of the reduction in the price of gas should be given at the same time, as it would "look better." It was suggested that consumers of gas in the out-districts might possibly insist on the reduction in the price of gas taking effect from the 8th of November, when the Act came into operation; but it being intimated that the Town Clerk had under his consideration a special point in connection with this question, the matter was adjourned.

Legal Intelligence.

SURREY QUARTER SESSIONS.—Thursday, Sept. 9.

(*Before Mr.* Hardman, *Chairman.*)

THE CONSPIRACY TO DEFRAUD A GAS COMPANY.

Thomas Henry Carman, landlord of the Grapes Tavern, Windmill Street, Haymarket; *William Thomas Henry Carman*, a clerk (his son); *George Phillips*, secretary of the New Kent Club, Station Road, Elephant and Castle; and *Joseph Horton*, gas-fitter, were indicted for having, in the month of May last, unlawfully conspired to feloniously steal a quantity of gas, the property of the South Metropolitan Gas Company. On other counts of the indictment they were charged with conspiring to cheat the Company of the gas; with conspiring to fraudulently prevent the meter from registering the quantity of gas supplied to Thomas Henry Carman; and with unlawfully attempting to steal a quantity of gas belonging to the Company. To all these counts the prisoners pleaded not guilty.

Mr. Besley and Mr. Mew conducted the prosecution; Mr. Montagu Williams defended the Carmans; Mr. Johnston Watson appeared for Phillips, and Mr. G. E. Lyon for Horton.

Mr. Besley, in opening the case, said he appeared with his friend Mr. Mew to conduct the prosecution on behalf of the South Metropolitan Gas Company, and the charge was that a plot had been entered into by the defendants for the purpose of burning gas without its being registered by the meter, and therefore without its being paid for by the consumer. It was as well that he should tell the jury who the persons were who were now on their trial. The elder Mr. Carman was a licensed victualler, keeping the Grapes Tavern, in Windmill Street, Haymarket, and he appeared, for the advantage of his son, to have been tenant of what was called the New Kent Club, carried on in an arch of the London, Chatham, and Dover Railway, in Station Road, Elephant and Castle. Here there were a number of billiard-tables, and owing to the play going on and the late hours to which the club, not being restricted by law, could be kept open, there was a large consumption of gas. The young man Carman was put in charge of this club, and the prisoner Phillips was manager with him. With regard to Phillips the jury would, of course, see that there was sufficient evidence to satisfy them that he was aware of the unlawful nature of the plot, and that he took part in it. As regarded Carman senior, the lessee, and Carman junior, who occasionally occupied and received the profits of the place, the motive would be strong enough to support the case, if the facts were proved clearly before them. With regard to Horton, who was the principal actor in the matter, it would seem from his statement before the Magistrate as if he was content enough to admit that he was guilty of another offence—namely, that of tampering with the gas-meter. Horton was a man who had been in a gas-meter manufactory, was a gas-fitter, and undoubtedly well acquainted with the mechanism of gas-meters; but he was not thoroughly conversant with the new mode of constructing them, though he knew perfectly well the character of gas-meters, whether dry or wet. He appeared to have been lodging for some weeks at 12, Hanover Court, Long Acre, and in the same lodgings was a man named Allen, whom he (the learned counsel) would put before the jury as a witness who would require confirmation in every particular. If the case turned upon Allen's evidence, without corroboration, he would not have to trouble them with any inquiry at all. The connection between Horton and Allen was to a certain extent increased by the fact that they were employed for a short time in reference to the salvage of the fire which occurred at the Civil Service Stores, in Bedford Street, Covent Garden, in May last. While they were so engaged they frequented Mr. Carman's tavern, in Windmill Street, Haymarket. It seemed that Horton on one occasion, when alone with Allen and Mr. Carman, sen., remarked that, being well acquainted with the mechanism of gas-meters, he knew a very simple way by which a portion of the gas passing through the meter would not be registered by the index. The jury would notice that if Horton were to suggest a means of stopping altogether the registering of the meter index, the Gas Company, through their Inspector, would soon find it out. Therefore it was a very different thing to tamper with a meter so that a portion of the gas should be registered, and to tamper with one in such a way as to stop its registration altogether. Horton said to Mr. Carman, "If you have a dry meter it is of no use; I can only operate upon a wet meter;" and Mr. Carman, instead of doing what he (the learned counsel) would have expected a person in his position to have done—getting information from him if possible for the benefit of the Gas Company—said, "I have not a dry meter here, but I know a place across the water where there is a great consumption of gas going on, and where there is a wet meter." Accordingly Horton was introduced to Mr. Carman, jun., and to Phillips. It would be as well that he should explain generally the mode in which wet and dry meters were made, to show how it was that a wet meter was mentioned specifically by Horton as the kind of meter to be tampered with. [The learned counsel then fully described the construction of ordinary wet and dry meters, with which our readers are familiar.] Formerly in the wet meters there was no guard, and, therefore, a workman like Horton, who knew the mode of manufacturing them, could, with a bradawl and hammer, pierce the drum, and the effect would be that whenever it rose to the point above water where it was pierced, the gas would come out without being registered, and find its way out through the outlet-pipe, and there would, of course, be a passing away of gas to the extent of the hole made in the drum during the period of time the hole was above water; but when the hole was below water the meter would register correctly. This explained how the plan of using a portion of the gas without payment prevented detection, because the Inspector would see that, though the meter did not register quite so much as in the corresponding half year, still there might be many reasons for decrease, and the Inspector would not suppose the meter to have been tampered with simply because the quantity of gas registered was less. In Horton's time they did not put a guard at the bottom of the meter. This was an upright piece of block tin behind, forming a protection against any perforation of the drum. It would be important for the jury to consider what were Allen's statements before the meter was examined by scientific gentlemen, and they would have to see whether he gave such a description of the operations by Horton as was confirmed afterwards by an examination of the meter. He said the first thing Horton did was to get a file filed down to a very sharp point, for the purpose of making the perforation, and it appeared that when he found the file was useless, the younger Carman gave him half-a-crown to have a drill made sufficiently fine and strong to bore the hole; and it appeared that, going to the club with Allen, who acted as an ordinary workman, he took off the cap and, according to Allen's account, said, "I never met with a meter like this; it has a guard to it;" and he, knowing he had not perforated the drum, said, "We'll persuade them we have done it;" because, according to Allen's account, an arrangement was made by Carman, sen., that Horton was to have money paid to him as a reward for damaging the meter so that the gas should not all be registered. Being foiled on the first attempt, he falsely represented that he had succeeded. But when he wanted to get money from Mr. Carman, sen., he said he must see that the consumption was less before paying any, and after taking the meter index for two or three nights, he found the consumption was not less, and, therefore, said the thing had not been done. Horton accordingly had some drills specially made, and went again to the club with Allen. Both Phillips and Carman, jun., were there, and Horton said, "We are come over to do the meter again." Accordingly the drills were used, Horton hammering away; and presently, hearing a noise in the meter, Horton said, "That has done it," meaning he had got through the guard and perforated the drum, and thought he heard the gas coming through the drum, proving that he had been successful. Up to the time of the meter being taken to Mr. Detheridge, the Inspector of Meters for the district, it was not known that he had not been successful; but he might tell the jury, at any rate, that he had not—that the drum never was pierced, and that no gas could possibly have been fraudulently obtained. But this did not affect the question of the prisoners plot to do it. After this it appeared that Phillips upon one occasion produced a paper upon which he had taken off the readings of the meter, and upon examining it with young Carman, they were really under the impression that the meter had been operated upon successfully, for they considered they were saving 200 or 300 feet of gas a night. A letter was consequently sent to Mr. Carman to give Horton the reward; but Mr. Carman said he should want a few days to see whether it lasted or not. All this, of course, was a mistake made by Phillips and young Carman, because, as he had already said, the prisoners had never had a single foot of gas, because the drum of the meter was not pierced. It appeared that from time to time 5s. and 2s. 6d. were obtained by Horton from Mr. Carman, sen., and then they found themselves surrounded by great difficulties. Horton threatened to expose Mr. Carman, sen., and so Mr. Carman frequently paid over sums of 2s. 6d. and 5s., under the belief that the fraud had been perpetrated. At last Allen told his story, and he (Mr. Besley) would inform the jury in what particulars he was corroborated. The main corroboration was that he spoke of one attempt and a second attempt, and when the meter came to be taken to pieces, there were two little holes, one large and one smaller, in the guard, but not in the drum. Then there was the account he gave of Horton saying he had never seen a meter with a guard. Then he spoke as to an alteration in the file, and they had a witness who proved that this was true. Then there was the borrowing of steps. They had the man who said he lent the steps to the man who came to borrow them for Mr. Carman, jun., at the club. They had also the man who made the drills—a respectable tradesman, against whom not a word was to be said. These were the material corroborations. It appeared that on the 18th of July Allen went and saw the officials of the South Metropolitan Gas Company, one of whom, Mr. Howard, would be called, and he had the meter removed and another put in its place, and the meter removed was taken to Mr. Detheridge direct, and kept by him under lock and key until it was examined, and then it was found that the attempt had failed; and that, though the guard had been pierced twice, the drum had not been affected in any way. With regard to the suggestion that this was an ordinary thing to do, that there was something wrong which required the meter to be interfered with, he said this was not usual. If the meter got out of order they had to send to the Gas Company, and require them to put it right; but no complaint was made. From the time when Mr. Carman entered upon the tenancy of this place up to the time of the communication made by Allen to the Gas Company's officials, no complaint was made of the meter. If the gas-fittings had required attending to, Mr. Carman, jun., would naturally have employed a man who lived close to the Elephant and Castle; it would be unnatural to get a workman to go there from the Haymarket. He asked if it was possible for there to be any explanation for operating upon this meter except that of operating upon it for the purpose of fraud. The jury would have to say whether Mr. Carman had not lent himself to Horton; he doing this thing for a reward, and young Mr. Carman and Phillips both taking part in the matter. Of course, with regard to Horton they would have read to them what he said before the Magistrate, for though he denied any fraud upon the Gas Company, he admitted damaging the meter; they would hear the scientific evidence upon it, that it was not proper for any one but the Gas Company's officials to unscrew the little plug at the bottom of the meter, and that the operation attempted to be performed by Horton could only be for the purpose of fraud. Those were the circumstances which the Gas Company felt bound, in the public interest, to place before the jury, that an inquiry might take place into the whole matter, and he had now to invite their attention to the evidence.

James Allen, examined by Mr. Besley, said: I am now living at No. 36, Page's Walk. Formerly I lived at No. 12, Hanover Court, Long Acre. I lodged there from the early part of March down to the beginning of July. I first knew the prisoner Joseph Horton about the early part of May, as he was lodging in the same house with me. I am a labourer. I did not know what Horton was at the time, but afterwards I did. I was working at the salvage from the fire at the Civil Service Stores, Bedford Street. I know the public-house of which Mr. Carman is landlord, in Great Windmill Street. I remember going there with Horton. On about the second occasion of my going there with Horton, when only he, Mr. Carman, and I were present, Horton told Mr. Carman he could effect for him a great saving in the consumption of his gas. Mr. Carman asked how this was to be done, and Horton told him that by piercing the drum of a wet meter the gas would escape into the body of the meter, and so pass through without being indexed. Mr. Carman said he quite understood that, but his was a dry meter, not a wet one; but he knew a place in the New Kent Road where they consumed a large quantity of gas, and that he could go over there. A note was given by Mr. Carman, sen., to Horton to go to the place referred to. Horton went with Mr. Carman into a back room, and made some private arrangement as to terms, but I could not hear what was said. Horton came out and told me he had arranged with Mr. Carman to receive £3 for the job—that he asked a £5 note, and Mr. Carman had agreed to give him £3. He said it was to be paid in instalments, 10s. to be paid first, and the rest by monthly instalments. Almost immediately after we received the direction we went over to Station Road, New Kent Road—that was the following day. We did not take any tools. We went to the New Kent Club, which is a railway arch converted into a billiard-room and club. We there saw Mr. Carman, jun., and Mr. Phillips. It was about half-past ten in the morning when we arrived there. I went into the club with Horton, but I did not hear anything that was said to Mr. Carman, jun., or to Phillips. Mr. Carman, jun., gave Horton 2s. 6d., and told him to get the tools made. We went to a blacksmith's to have the drill produced made. Horton said he wanted a drill made, and he picked up a three-cornered file and asked the smith to draw it out. Afterwards I stepped outside while the file was being drawn into a drill. Horton came out and said he had drawn it out and made it round—made both edges alike; so he had taken the file away from the smith and put it in a vice and altered it himself. I saw that done. Horton left 2s. 6d. on it, and was to pay 6d. for the making of it. I pointed out the shop to detective Reed. Having got this tool we came back to the New Kent Club. Horton then directed me to go next door and borrow a pair of steps. The steps were to get up to the meter, which is over the shop. I got the steps and took them to the club, and when I went back Carman, jun., was standing in the billiard-room, and Phillips was having his breakfast at a side table almost at the end of the room. I placed the steps, and Horton

mounted up on to the platform where the meter was, and called me up to follow him. He then unscrewed the top of the outlet plug of the meter, and introduced his drill and gave it two or three thumps. He then said, "I have never seen a meter like this before; there is a metal guard or plate in front." He did not speak loud enough for Carman, jun., to hear. Then he said, "Never mind; let them think it is done," and he put some water in the meter and replaced the plug. Having done this, he came down the steps and went up to Mr. Carman, jun., and I believe I heard him say, "I have done it," and then walked away to the bar. I did not hear any other conversation beyond what I have spoken to. We then left, and at night went over to Mr. Carman, sen. We took the file back, and on that occasion Mr. Carman, jun., accompanied us. He did not go into the shop, but stayed at the top of the roadway with me while Horton went and returned the file. Horton gave back the 2s. 6d. to Mr. Carman, jun. I am not sure whether it was on this or on another occasion that Horton took a note over from young Mr. Carman to Mr. Carman, sen., but late that afternoon we went to the Grapes. Horton told Mr. Carman, sen., he had done the job, and Mr. Carman gave him 5s. Horton said, "That is not according to your agreement; you promised to give me 10s." Carman said, "You do not think I am going to give you 10s. and not know whether it is done or not;" and then we went away. He gave us a note, and we afterwards went over to Phillips and Carman, jun., to see how they were getting on. Phillips produced a paper which had on it the readings of the index which he had taken, and he showed it to Horton. I did not hear the conversation, and I cannot say that I should know the paper again. I saw one at the Police Court which very much resembles it, but it has been added to a great deal. When we came away Horton said Mr. Phillips did not seem satisfied, and said there was no doubt that he had not pierced the meter, and he said he would get some other tools. Mr. Phillips always took an active part with regard to the meter, and the paper of the readings was in Mr. Phillips's possession. After Horton's saying he would get some other tools, I went with him to Regency Street, Westminster, to a man whom he knew of the name of Underhill. From Underhill he borrowed two drills. Horton said the tools that were borrowed were the sort of things, and he used one of them on a penny piece and other metals to try the efficacy of it. On getting home to his lodgings he found that he had a little stabbing awl, and he made the remark that this was just the thing to do the job. Before we went to the club again we went to Mr. Carman, sen., and Horton showed him the two drills he had obtained. We went to the club on the following day, but I do not know whether our intention to do so was mentioned to Mr. Carman or not. On reaching the club we saw Mr. Carman, jun., and Mr. Phillips. Horton had the two drills and the awl with him, and a hammer. Phillips was only absent on one occasion that we went over there, but I cannot fix which occasion it was. We went up to the meter as before, and Horton unscrewed the plug and introduced his stabbing awl, and struck it with a hammer once or twice. He said, "That's done it," and I then heard the gas whistle out through the hole. It came out from the overflow plug with a whistling noise. We replaced the screw and filled it up with water. Horton then went and spoke to Mr. Carman, jun., and we came down, but I did not hear the conversation. We went to the Grapes the same night, Horton having a note from Mr. Carman, jun.; but I did not see it written. We went back to the club a few days after to see what effect had been produced. Phillips was there, and showed a paper to Horton, and Horton said, "Yes, there is an apparent saving of some feet;" on the two nights following the piercing of the meter they had only burnt 600 feet of gas each night, and that was an apparent saving. Phillips said that they certainly had burnt less, according to the reading. He showed Horton that on some nights they had burnt only a small quantity, but on other nights it was greater. I am unable to identify the paper, but the reading was always indicated upon the same paper, added to from time to time. Whenever Horton wanted money he always went to the Grapes; it may have been possibly half-a-dozen or a dozen times that I went with him. Sometimes Mr. Carman was not at the Grapes when we went there, and then Horton would wait or go again in the evening. I have seen money given to Horton on several occasions. Horton always demanded money, and generally Mr. Carman gave him some. On one occasion Mr. Carman was very angry with Horton when he went over and demanded money. Mr. Carman said he had only agreed to give him £2, I think it was. Horton said, "No; £3 was the agreement," and there were a great many words. I cannot recollect whether he received any money or not on that occasion. About the 13th of July I went to Mr. Livesey, one of the officials of the South Metropolitan Gas Company. He took me to Mr. Howard, and I made a statement to him. The next day, by the direction of Mr. Howard, I saw Mr. Washington, the Solicitor, and made a further statement to him. At that time I did not know that the meter I saw operated upon had been moved from the New Kent Club. I am not acquainted with the manufacture of gas-meters, but I know the difference between a wet and a dry meter. On each occasion at the Police Court I saw the meter that was at the New Kent Club, after it had been taken to pieces, and examined by Mr. Detheridge. I made my statement before I saw the meter.

Cross-examined by Mr. WILLIAMS: The first time that I went to the Grapes I was a perfect stranger to Mr. Carman. It was on the occasion of our second visit that Horton told Mr. Carman he could save him a great deal of gas if he had a wet meter. Carman did not ask who Horton or I was; but without further observation he said, "I quite understand you. I have not a wet meter, but I know a place over the water where they consume a quantity of gas." I never had a shilling of the money Horton received from Carman. I never asked Horton for a part of the £3. I never heard any conversation at the Grapes with reference to the gas not burning properly. I remember hearing Phillips say to Horton that a fitter had been to see to the gas, but I forget when it was. I had a quarrel with Horton eight or ten days before I made the statement to the Gas Company. I never asked Mr. Carman to give me any money. I understood, as the plan developed itself, that it was a conspiracy to defraud; but I did not know I was committing a criminal offence and was subject to prosecution.

Mr. WILLIAMS: I presume your quarrel with Horton had nothing to do with your going to the Gas Company and making this statement?

Witness: Yes, it had. I did it to spite Horton; it had nothing to do with furthering the ends of justice.

Cross-examination continued: I am now working for the Gas Company. They have employed me ever since I went to them and made this statement.

In re-examination by Mr. BESLEY, witness gave some particulars as to his quarrel with Horton, and his previous connection with him.

John Rollins, a blacksmith, deposed to having known Allen and Horton, and to their having come to the shop where he was employed and borrowed a file, as witness stated before the Magistrate. *John Jenner Saltmarsh*, a billiard-table keeper in the Station Road, deposed to the lending of the ladder; and *Samuel John Underhill* to the lending of the small files and the punch. Evidence was also given by *Charles Wilson*, the proprietor of the New Kent Club, as to Carman, sen., entering upon the tenancy of the premises in May last, when a 20-light meter was put up. He stated that he was in the club when Horton and Allen were there at work on the meter. Mr. Carman had complained to him of insufficiency of light, and of the lights jumping, and he had noticed a flickering every evening from the time the wet meter was fixed till the dry one was put up on the 13th of July.

Mr. *Charles Howard*, Chief Inspector of the South Metropolitan Gas Company, examined by Mr. BESLEY, said: I remember Allen calling to see me, he having previously seen Mr. G. Livesey, the Secretary of the Company. He made a statement, upon which, before communicating with any one at the New Kent Club, I gave directions for the meter to be taken away and another to be placed there. It was the South Metropolitan Company's meter. Before meters can be used they have to be stamped by an officer appointed by the Board of Works, who is called the Government Gas Inspector. Mr. Detheridge is appointed for this district. Every meter is numbered and stamped. I gave directions for the meter to be taken away from the club direct to Mr. Detheridge's, and I saw it on the following day. Mr. Detheridge was present. At that time it was being tried, and there was a light attached to it. It was perfect at the time I saw it. Upon trial the meter registered correctly, and it is so reported by Mr. Detheridge. Mr. Detheridge told me it was correct, and on the 14th of July a triangular piece was knocked away. The meter produced is a wet meter, and when perfect this triangular piece [produced] is soldered on. With a wet meter there is a drum inside the meter. [A small meter with a glass back was produced to show the drum.] In a wet meter the water should reach the waste-pipe. When a meter is properly charged, the water should just reach the top of that [pointing], and if there is more it then falls into the waste-box below. This [pointing] is the waste-box. Rather more than half the drum would be under water. It revolves by the pressure of the gas, which is admitted by the inlet-pipe. When the drum is perfect, the gas passes through the inlet-pipe into the meter, and the meter is charged with gas as far as the water-line I have described. At the water-line is gas, and it passes through there into the drum at the back. As the drum revolves it moves this spindle [pointing], and that spindle turns the hands of the index. This is the waste-box, and this the waste-plug. This plug can be easily removed, and by putting in a brad-awl or drill it comes against the guard. I am unable to say within what period of time wet meters have been made with guards. I have seen wet meters made without such a guard as this. The waste-water box would be charged with gas up to the plug. The perforation of the guard would immediately allow the gas to escape into the hole. If the drum had been perforated through this hole, it would have been invisible, and when the drum revolved as this one would do as the gas passed through the meter, when the lower portion of it had made a revolution the hole in the drum would allow the gas to escape unregistered through the outlet as long as the hole was above the water-line. The larger the hole the more gas would pass unregistered—some would pass with every revolution. Our inspectors go to take the readings of the index twice every quarter—at the quarter, for the purpose of making up our accounts, and at the half quarter as well. The inspector might possibly find out that the drum was perforated from the fact of there being a very large quantity of water, but he might pass it over if he were not an experienced man. I do not think I should pass it over myself. There would be no outward sign of any perforation or tampering with the meter in any way, owing to the plug having been taken off and replaced. The consumption of gas in billiard-rooms would vary according to the amount of play going on. The diminution in the amount to be charged from the readings of the index would not call the inspector's attention to the fact of the gas passing unregistered. All the accounts pass through my hands, and in connection with a billiard-room I should think the alteration would arise from the fact of there not having been so much play as usual, but in the case of a private house I should have a suspicion. We received no complaint as to the gas supplied to this club until after this discovery was made and the meter had been taken away. We keep a register of complaints, and I have examined it carefully. This meter [produced] is a dry one. When the inlet and outlet pipes are connected with this meter, there is no access to the interior of the meter. It can only be tampered with by opening the case here [pointing], which is soldered up. As to perforation with an awl or drill it would be seen outside. There is no such thing as a drum in a dry meter. [Witness produced the inside of a dry meter, and explained to the jury the manner in which the gas passed through.] I saw the triangular piece taken off the meter. The meter was in a perfect state when I went to Mr. Detheridge's. I at first had some doubt as to Allen's statement, but when I arrived there we discovered a small indentation through the hole. The guard was perforated. There were two holes, and the sign of a third. Those holes could be made with such instruments as the bradawl and the two drills produced. I think there would be some difficulty in doing it with the file, as it would be more likely to bend than to make the perforation. The drum was not perforated, and no gas could pass through unregistered. When anything is the matter with a meter, the people write to the Gas Company, and we give no gas-fitter in our district permission to touch a meter; in fact, we prosecute them for so doing. Upon complaints being made of gas flickering, we send a man to attend to the matter. We do not charge anything for it, and as far as the meter goes we keep it in repair, and the supply-pipes too. It would be quite unnecessary, under any circumstances, to take off the plug and perforate two holes in the guard, and no one would think of doing it. In this meter I saw the waste-box taken off, and it was perfectly clear and not corroded in any way, so that there was no necessity for any such operation. When corrosion takes place the perforation of the guard is unnecessary under any circumstances. In the case of a flickering there might be a reason for touching the water-plug, as it might arise from an overflow of water, and then it would only be necessary to remove the plug and let the water out. The stabbing awl and perforation could have no possible object except to let out the gas.

Cross-examined by Mr. WILLIAMS: Supposing the drum had been perforated with such a hole as that on the outside guard, I cannot form any notion as to how many feet of gas would be lost in the course of a quarter; it would depend upon how many hours a day it was burning.

Re-examined by Mr. BESLEY: I have tested this hole, and find that it would pass 9 feet an hour. Ten hours a day for gas to be burning in a billiard room would not be anything unusual.

George Frederick Beverton and *John Mathers*, both in the employment of the Company, deposed to removing the meter from No. 9, Station Road, and putting up another in its place.

Mr. *George Detheridge*, examined by Mr. MEW, said he was the official Inspector of Meters for the district, and the meter produced was brought to him on the 13th of July and placed under lock and key. He had heard the evidence given by Mr. Howard, and agreed with what he had said.

George Hewes, a clerk in the employ of the Company, repeated his evidence given before the Magistrate as to receiving a letter from Mr. Carman complaining of water getting into the gas-fittings, and his determination to have a dry meter.

The prisoners statements when before the Magistrate were then put in, and

Mr. BESLEY summed up the case for the prosecution, stating that he

wished to do nothing but assist the jury in arriving at a proper conclusion, because the Gas Company had no partizanship or feeling in the matter, and no one who had seen Mr. Howard, as representing the gas company, could say that the action he had taken was other than a duty imposed upon him. He pointed out that the temptation to defraud Gas Companies was somewhat different from the temptation to defraud an ordinary salesman, because in the latter case the articles were weighed or measured in the presence of both parties; but in the case of the sale of gas the "scales" were entrusted to the buyer, as provided by the statutes, and the companies were therefore somewhat in the power of the consumers. Therefore to take advantage of a gas company was not only a felony or a fraud, but a cowardly thing to do. The Legislature gave certain protection to the consumers of gas, and imposed certain duties on them. Starting with that, he asked what was the answer to Allen's disclosures? The sole answer was that he was a disreputable person, but in his (Mr. Besley's) view this was not sufficient to warrant them in acquitting the prisoners. He pointed out that there had been no material variation in the statements made by Allen to Mr. Howard and Mr. Washington (the Company's Solicitor), at the Police Court and upon the present occasion, and dwelt on the improbability of Horton's visit to the club having been for the purpose of legitimately attending to the meter, as he, having served an apprenticeship to the meter-making business, knew perfectly well he had no right to touch a meter, while if any ordinary gas-fitting was required it was not likely that a workman would be sent from Windmill Street to the Elephant and Castle for the purpose, but a fitter on the spot would have been engaged. At some length he mentioned the various points of confirmation of Allen's statements, and directed especial attention to the condition of the meter as the strongest element of confirmation, and also to the fact that on the guard being pierced there would be a whistling noise, as described by Allen, and which none but a skilled witness like Mr. Howard would have knowledge of. He defended the action of the Gas Company in having since employed Allen, and expressed his hope that they would retain him in their service. He concluded by asking the jury to look at the question as one of evidence simply, and if they thought the evidence bore more in favour of any of the prisoners than others, especially Phillips, to give them the benefit of any doubt they might have.

Mr. WILLIAMS then addressed the jury on behalf of the prisoners Carman, and referred at considerable length to the past history of Allen, and to urge that his evidence was not worthy of credit, especially as he confessed he was animated with the idea of spiting Horton. He contended that all the points of confirmation urged by Mr. Besley were thoroughly consistent with the perfect innocence of the prisoners. Mr. Besley had suggested that they might let Phillips go, and convict the rest; but they could not do this, because if Allen's story was true all were alike guilty, while if it was not true none of them were guilty. He made special allusion to the fact that everything was done openly and in view of any one who went into the place, and he urged them to adopt the view of the matter disclosed by Horton's statement before the Magistrate, which he contended was the more probable, and not by their verdict sacrifice the character and liberty and almost the life of his clients.

Mr. J. WATSON said that, representing Phillips, he was loth to occupy much time in addressing the jury upon the facts of the case, as he understood that the prosecution of his client had been virtually abandoned. Mr. Besley started by pointing out that Phillips could have no motive for conspiring to commit the crime, and after indicating precisely the position he occupied in the business as manager, not having the same motive for defrauding the Gas Company as the two Carmans had, he went on to tell the jury that they must have very strict evidence of his guilt. Judging of the course the case had taken, he did not think it necessary to speak as to the facts, and therefore would propose only to call witnesses to character, and having called those witnesses he was sure he might safely leave Phillips's case in the hands of the jury.

Mr. LYON also addressed the jury on behalf of Horton, alleging that the story of the plot was a deliberate fabrication on the part of Allen to spite Horton, and he had been ingenious enough to include in the charge the only men who would have had the means of going into the witness-box to contradict his assertions. He remarked upon the absence of motive for such a conspiracy as alleged, the utmost saving that could have been effected being but 33s. a quarter, while discovery could not possibly be long delayed.

Numerous witnesses were then called who bore testimony to the good character for honesty and respectability which the Carmans and Phillips possessed, after which,

Mr. *Howard* was recalled, and, in answer to the CHAIRMAN, stated that if the drum of a meter were pierced the water would not go into the perforated part and stop the meter from working, as the drum always worked in water. Taking the water out of the meter would not stop the flickering, which arose from water in the service-pipe—most probably water condensed in the service-pipe. If the meter were overcharged with water, taking away the surplus would stop the flickering.

The CHAIRMAN then summed up the whole case to the jury, reminding them that the question of character had nothing to do with the issue before them. As to the allegation that the meter was out of order, they must assume that the consumer, and especially so large a consumer as Mr. Carman, sen., was, knew that only the Company had a right to interfere with the meter, for it was almost a matter of common knowledge with persons who consume gas. Having directed the jury that they must have confirmation of Allen's statement, he proceeded to point out in what particulars this confirmation had been afforded by the evidence, and remarked that the fact that the prisoners had not succeeded in their attempt to defraud the Company, if the attempt was made, should not influence their decision. As to the plea that there was little or no motive, he was sure they had sufficient experience in these courts to lead them to know upon what very small inducements people would sacrifice the character of a lifetime; and the simple question for them to consider was whether they believed that the defendants did conspire to defraud the Company. He then dealt with the law relating to conspiracy, and directed them to consider whether the younger Carman, being under the control and influence of his father, was a person so guilty as the others. With regard to Phillips, if they believed Allen's story, he was concerned in the matter too, and must be found guilty at their hands, although it must be admitted that he had no adequate motive for joining in the conspiracy.

The jury then retired, and were absent more than an hour. Upon their return the Foreman announced that they had found Carman, sen., and Horton "Guilty," and Phillips and the younger Carman "Not Guilty."

The CHAIRMAN then sentenced Carman to three months and Horton to four months imprisonment.

MONDAY, SEPT. 13.

Mr. LYON to-day applied to the Court for a mitigation of the sentence on behalf of Carman. He said the prisoner was the father of a family of six young children, who were entirely dependent upon him for support. He had been recommended to mercy by the jury, who had all signed a petition to the Court in favour of a mitigation of the sentence, and as the offence was one which was punishable by fine, the learned counsel hoped the Chairman would modify the sentence.

The CHAIRMAN said in his opinion the jury had strained a point in favour of the prisoner in recommending him to mercy. In his opinion the prisoner was fortunate in escaping hard labour, and, having regard to all the circumstances, the Court could not alter the sentence which had been inflicted in the case.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

It is stated that, in consequence of the report made to Parliament last session by the Select Committee on London Water Supply, the eight Companies have agreed to oppose, as one body, any scheme which the Government may bring forward for the purchase of all, or any, of their undertakings.

The Registrar-General publishes the following table in reference to the water supply of London during August. According to returns furnished to him by the Metropolitan Water Companies, 151,766,015 gallons, or 689,543 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight), were supplied daily, or 256 gallons (116·3 decalitres), rather more than a *ton* by weight, to each house, and 36·1 gallons (16·4 decalitres) to each person, against 34·8 gallons during August, 1879.

Companies.	Number of Houses, &c., supplied in Aug., 1879.	Aug., 1880.	Aver. Daily Supply of Water in Gallons* during Aug., 1879.	Aug., 1880.
Total supply	567,920	592,163	140,250,771	151,766,015
From Thames	270,925	283,834	71,426,320	76,252,909
,, Lea and other Sources	296,995	308,329	68,824,451	75,513,106
THAMES.				
Chelsea	29,700	30,071	8,921,600	9,376,200
West Middlesex	52,742	55,204	10,993,387	11,681,550
Southwark and Vauxhall	86,927	91,165	24,667,853	25,061,238
Grand Junction	39,648	42,491	12,344,180	13,568,321
Lambeth	61,908	64,903	14,499,300	16,565,600
LEA AND OTHER SOURCES.				
New River	128,709	131,425	28,902,000	31,343,000
East London	120,459	126,752	31,208,800	35,139,000
Kent	47,827	50,152	8,713,651	9,031,106

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for August, 1880, as compared with that for the corresponding month of 1879, shows an increase of 24,243 houses, and of 11,515,244 gallons of water supplied daily.

The following is Dr. Frankland's report of his analyses of the water supplied to London during August:—"Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies, and by the Tottenham Local Board of Health, was—Kent, 1·6; Colne Valley, 1·6; Tottenham, 1·6; New River, 3·1; Chelsea, 5·1; Grand Junction, 5·8; West Middlesex, 6·7; East London, 7·0; Southwark, 7·1; Lambeth, 7·8. The Thames water supplied to London was of very bad quality, that of the Chelsea and Grand Junction Companies being also slightly turbid; but the water of the West Middlesex, Southwark, and Lambeth Companies, though efficiently filtered, was quite unfit for dietetic purposes, owing to the large quantity of organic matter which it contained. The Lea water distributed by the East London Company, though efficiently filtered, was no better than Thames water; but that sent out by the New River Company, though inferior to the supply in July, was much better than that of any other Company drawing from a river. The deep-well water supplied by the Kent and Colne Valley Companies and by the Tottenham Local Board of Health was of its usual excellent quality for dietetic purposes, and that sent out by the Colne Valley Company was suitable for all domestic purposes, having been softened before delivery. Seen through a stratum two feet deep, the waters presented the following appearances:—Kent, Colne Valley, and Tottenham, clear and colourless; New River, clear and pale yellow; Chelsea, Southwark, Lambeth, and East London, clear and yellow; West Middlesex and Grand Junction, slightly turbid and yellow. The temperature of the river waters when drawn from the mains was very high, ranging from 17·2° C. (63° Fahr.) to 20° C. (68° Fahr.). At these temperatures the water is vapid and unpalatable. The deep-well waters maintained a much lower temperature, ranging from 12·2° C. (54° Fahr.) to 13·5° C. (56·3° Fahr.)"

Results of Analyses expressed in Parts per 100,000.

Companies or Local Authorities.	Total Solid Matters.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Chlorine.	Total Hardness.
Inner Circle.								
Thames—								
Chelsea	25·76	·250	·049	0	·116	·165	1·5	18·5
West Middlesex	28·26	·341	·053	0	·142	·195	1·5	19·4
Southwark	28·12	·369	·059	0	·144	·203	1·5	19·4
Grand Junction	28·10	·274	·067	0	·142	·209	1·5	19·1
Lambeth	30·10	·404	·058	0	·176	·234	1·5	20·9
Lea—								
New River	27·02	·148	·036	0	·163	·199	1·6	19·4
East London	25·44	·359	·052	0	·096	·148	1·8	19·4
Deep wells—Kent	43·32	·078	·014	·002	·389	·405	2·5	27·8
Outer Circle.								
Colne Valley	11·98	·077	·017	0	·314	·331	1·4	5·6
Tottenham Local Board	40·76	·081	·016	·058	0	·063	2·9	20·5
Corporation of Birmingham*	22·76	·259	·027	·003	·216	·245	1·8	11·7
Corporation of Glasgow†	2·90	·139	·015	0	·006	·021	·6	·9

* Analyzed by Dr. Alfred Hill, Medical Officer of Health and Analyst to the Borough.
† Analyzed by Dr. E. J. Mills, F.R.S., of Anderson's College, Glasgow.

Note.—The numbers in the analytical table can be converted into grains per imperial gallon by multiplying them by seven, and then moving the decimal point one place to the left. The same operation transforms the hardness in the table into degrees of hardness on Clark's scale.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the Albion Tavern, Aldersgate Street, E.C., on Thursday last—Professor Erasmus Wilson, F.R.S., in the chair.

The Secretary (Mr. Magnus Ohren, Assoc. M. Inst. C.E.) having read the notice convening the meeting, the following report and the statement of accounts were taken as read:—

The Directors report that the general working of the Company during the half year has been satisfactory.

The price of gas has been reduced to the general consumer to 3s. 8d. per 1000 cubic feet from the last Midsummer quarter.

The reports of the Gas Examiners of the parishes supplied by the Company, as to the illuminating power of the gas and its freedom from sulphuretted hydrogen and ammonia, continue to be satisfactory.

The Directors recommend the declaration of a dividend for the half year ending the 30th of June last at the following rates per annum—viz., 6 per cent. on the preference stock, 7 per cent. on the ordinary 7 per cent. stock, 10 per cent. on the ordinary 10 per cent. stock, and 7 per cent. on the new ordinary 7 per cent. shares, all less income-tax. This will amount to £11,071 14s. 2d., and the sum of £1755 9s. 8d. will be carried forward to the profit of the succeeding half year.

REVENUE ACCOUNT, *for the Half Year ended June* 30, 1880.

Dr.						Cr.				
To Manufacture of gas—						By Sale of gas—				
Coals, including all expenses			£19,349	14	3	Private rental—				
Purifying materials, wages, &c.			1,026	1	9	Lady-day quarter—				
Salaries of Engineer and Officers			606	5	0	At 3s. 7d. and 3s. 9d. per 1000 cubic feet			£25,456	16 3
Wages and gratuities			3,346	17	8	Midsummer quarter—				
Works, machines, and retorts—maintenance of, repairs, and labour	£5,087	18 8				At 3s. 7d. and 3s. 9d. per 1000 cubic feet			12,256	5 7
Less old material	29	6 3				Private rental, the half year			£37,713	1 10
			5,058	12	5	Public rental, the half year, on 1835 lamps.			3,936	10 11
					£29,387 11 1	Gas rental			£41,649	12 9
Distribution of gas—						Rental of meters—				
Salaries of Chief Inspector, Inspectors, and Clerks in Light Office			£738	18	2	Rental for the half year			623	17 11
Mains and service-pipes, repairs, maintenance, renewal, and labour			1,295	15	3	Total rental			£42,273	10 8
Meters and gas-stoves, repairing and renewing, &c.			1,362	2	4	Residual products—				
					3,396 15 9	Coke, less labour and cartage		£6,706 6 7		
Public lamps—						Breeze " "		233 2 7		
Lighting and repairing					739 13 1	Tar		889 14 5		
Rents, rates, and taxes—						Sundries		4 8 6		
Rents			£30	6	10			£7,833 12 1		
Rates and taxes			1,736	12	0	Sulphate and ammoniacal liquor, less acid, labour, repairs, &c.		2,419 11 9		
					1,766 18 10				10,253	3 10
Management—						Rents			98	18 1
Directors allowances			£750	0	0					
Salaries of Secretary, Accountant, Clerks, and Messenger			582	14	4					
Collectors commission			969	11	2					
Stationery and printing			282	8	4					
General establishment charges			346	6	5					
Auditors			50	0	0					
					2,981 0 3					
Sundries—										
Law and parliamentary charges					7 12 0					
Bad debts					265 5 11					
Insurance-fund					212 10 6					
Horses and carts					9 5 0					
Total expenditure					£38,766 12 5					
Balance carried to profit and loss account					13,859 0 2					
					£52,625 12 7	Total receipts			£52,625	12 7

PROFIT AND LOSS ACCOUNT (Net Revenue).

To Reserved fund account, amount carried from the half year's profits					£2,500 0 0	By Balance of net profit from last account			£11,986	11 4
Balance of net profit to be carried to next account, subject to half year's dividends to June 30					12,827 3 10	Less dividend paid for the half year ended the 31st of December			10,634	10 4
					£15,327 3 10				£1,352	1 0
						Balance from revenue account, being profit for the half year			13,859	0 2
						Interest on deposits			116	2 8
									£15,327	3 10

The Chairman, in moving the adoption of the report, remarked that he might venture to say that it was, as usual, of a gratifying character, and the Directors were enabled to state to the Shareholders that the Company's business in every way was proceeding in a perfectly satisfactory manner. He might almost congratulate them on the small number of Proprietors assembled on the occasion, for it was, perhaps, one of the best proofs of the confidence they had in the stability of the undertaking, and of the harmony which was likely to prevail at the meeting. He might also hope that the profits of the Company had in a certain degree induced some of the Shareholders to remain out of town, in lieu of coming into close London to attend the meeting. He regretted that they would be deprived of the pleasure of the attendance of one of the Auditors on this occasion, as he was in one of the Western Islands of Scotland, in a part where gas was more highly considered and more highly valued than it was among ourselves. Custom and habit, he supposed, had rendered us less capable of appreciating that great blessing to society. They found that his (the Chairman's) countrymen, the Scots, who were not always celebrated for their liberality, but looked twice at a "baubee" before they spent it, were nevertheless content to pay 9s. 10d. per 1000 feet for their gas in the part where their Auditor was staying. The Directors only regretted that this Company's consumers were not there, instead of being where they were, provided they were in sufficient number to remunerate the Company for their production. The Shareholders would have observed that the Directors were doing what they had done almost from the beginning—reducing the price of gas to the consumers. They had always considered that their first interest was in satisfying the consumer, in attending to his wants and interests; and therefore whenever the opportunity had been given to reduce the price of their gas, they had gladly availed themselves of it. There were circumstances which naturally prevented them from being as low in price as some other companies. Their being as it were, extra-Metropolitan company, their provincial district, the peculiar characteristics of their district—its high hills and low valleys—and a number of other things, rendered the cost of the production and distribution of their gas greater than would be the case in cities and in centres; and more particularly the divided position of the population, who, instead of congregating in streets, were more healthily and more happily distributed between intervening spaces of ground. The Directors still exerted themselves to keep up the purity of the gas to a satisfactory standard, and also its illuminating power; and the last paragraph in the report showed that the amount of profits was what the Shareholders had been accustomed to for some years, and enabled them to maintain the dividends at the maximum. He thought he need not say anything further with regard to the Company. The works were now in good order, and were capable of any future increase that might happen to be required. The Company had land to spare, on which they could extend their plant and works; and, on the whole, their position was just as satisfactory now as it was at the very beginning; and they would be prepared for any amount of increase in the consumption which might manifest itself in the district.

Mr. F. L. Linging seconded the motion.

Mr. R. H. Jones said there were so many good features in the report and accounts that one had a difficulty in finding fault, and it was far from his desire to do so. At the same time there were one or two points which required a little explanation. The cost of purifying seemed very high, for which, however, the Directors had, no doubt, sufficient explanation—that they were under peculiar circumstances, which had rendered it necessary for them to spend £1026 in the half year for purification. Another item he felt interested in as a consumer was the bad debts, which seemed very heavy compared with the accounts of other companies. Comparing the Company with the Brighton and Hove Company, which, he said, was somewhat similarly situated, their bad debts should be about £150 instead of £265. He also noticed that there was a considerable falling-off in the residuals—about £1500. These items, no doubt, were unavoidable; but at the same time one could not but notice them in glancing through the accounts. On the other hand, there were some very promising features. Their make of gas per ton of coal carbonized was good.

The Chairman said he was very glad that Mr. Jones had called attention to the items referred to, because he was sure the Directors would be able to give the Shareholders a thoroughly satisfactory explanation.

Dr. Puckle said that the Chairman had stated that the position of the Company now was as satisfactory as at the commencement. When the Company was first established, however, they had the power to charge 6s. per 1000 feet, whereas according to the report the price was reduced to 3s. 8d. per 1000, and there were many consumers in the district who, when the Company was first established, had they heard the Chairman's remark, would, he thought, agree with him (Dr. Puckle) that instead of paying 6s. per 1000, it was very much more satisfactory to have to pay only 3s. 8d. Therefore, although, as regarded the position of the Shareholders, their dividends had always been fully maintained, he held that as regarded the public their position as to this Company had been very greatly improved, and that the reduction to 3s. 8d. per 1000 feet was a matter for which the consumers had to thank the Board, as it arose from the very able manner in which they had managed the affairs of the Company. He had complimented the Board on previous occasions for the manner in which they had placed the accounts in the hands of the Shareholders, and he had further to compliment them on having made them more perfect. The insertion of the statement of gas made and sold gave a very fair indication of the affairs of the Company, as far as the engineering department was concerned; and it was most satisfactory to find that over 10,000 cubic feet of gas had been obtained for every ton of coal carbonized. This showed that there was a very good head in the engineering department. It was also very satisfactory to find that, in a district in which the levels were so difficult, the unaccounted-for gas was not more than 5½ per cent. of the quantity manufactured. They must congratulate themselves not only on the maintenance, as usual, of the full dividends, but on the fact that the Company had accumulated in the past twelve months a sum of about £8000, which had been placed to the various reserve, contingent, and insurance funds. Those funds now amounted to within £5000 of the total sum at which they could stand by the Company's statutory obligations, and this being so the Directors had felt themselves bound to reduce the price of gas. There was one matter of regret in connection with the Company—that two years ago it was not in the financial condition that it could apply for power to raise additional capital. He had no doubt that they could have been placed under the sliding scale at 4s. 2d. per 1000, as the adjoining Company were at 4s. 7d., and if they could have done this the Shareholders would probably have been receiving 11½ and 8¼ per cent. instead of 10 and 7 per cent. It was therefore rather unfortunate that the very prosperity of the Company might one day, when they went to Parliament for more money, be the means of placing their capital on a low sliding scale. There was, however, a large amount of capital still

unexpended. He congratulated his brother Shareholders on the prosperity of the Company, and thought that the Directors were worthy of their warmest thanks for having done so much in placing them in such a good position, and at the same time conferring such great benefit on the public.

The DEPUTY-CHAIRMAN (Mr. H. P. Stephenson) said with regard to Dr. Puckle's remark about their going to Parliament, he had every reason to hope and believe that they would not require to go to Parliament for more capital for some twelve or fifteen years to come, and even if they had to go now he individually believed—and he believed his co-Directors almost unanimously agreed with him—that they would rather be under their Act with their 6s. maximum price of gas, paying 10 per cent. dividend as a maximum, than under an Act with a low initial price and paying a higher dividend. He wanted to warn the Shareholders against seeing 11½ per cent. dangling before their eyes and trying to persuade themselves that they preferred 11½ per cent. to 10 per cent. It was all very well at the present moment, their 11½ per cent., with coals low and the business of the country generally in a depressed condition; but if the iron industry of the country and business generally prospered, what would be the immediate effect on the coal market? Why, that coals would go up, and the result of this to gas companies would be that their profits would considerably diminish—he did not say wholly attributable to the rise in coal—and then possibly if they had been paying 11½ or 12 per cent. on their initial price they would find themselves compelled to reduce the dividend or raise the price of gas, and then the sliding scale cut the other way. If for every penny decrease in the price they obtained one quarter per cent. more dividend, on the other hand for every penny increase in the price they were denuded of one quarter per cent. on that which they already had; and he should be very sorry to meet the Shareholders of the Company with a 9½ or 9 per cent. dividend. He therefore hoped they would be contented with the maximum dividend which they could so clearly pay, rather than strain after an increased dividend, which he believed had to a certain extent a demoralizing effect on the directors of a company, because it tended to induce them to place more to capital account than they would otherwise do. He did not think the full effect of the sliding scale had been thoroughly gone into. It had the demoralizing effect he had referred to, though he did not say that directors would be guided by it; and the complaint in times past against gas companies had been that they charged more to capital account than they ought to, to put more into the shareholders pockets. He held that the sliding scale had the same effect—putting more to capital account, and so increasing the dividend to the shareholders. This was his own opinion, though he knew that others held different views. With regard to the remarks of Mr. Jones, the cost of purification was high, no doubt, and it arose in this way: They were under a 20-grain limit for sulphur compounds, and not only had they to use a large quantity of lime to keep free from fines under this limit, but also in order to keep free from nuisance they had to pay a very large sum and make special arrangements to take away the waste lime, which was a very foul material—sulphide of calcium. He only hoped they would always be able to get rid of it on the same terms as at present—by paying for it. As to the bad debts, they were a little high, but the Directors had taken every precaution to reduce them as much as possible. He thought the Shareholders would see that it was no fault in the collection when he told them that, as a general rule, they collected over 98 per cent. of their quarter's charges within the quarter. That was not a very bad collection. Of the remainder, about 2 per cent., it was perhaps unfortunate that more of it represented bad debts than ought to be the case. He did not think the results obtained from the residuals was matter of complaint against the Company, for every one connected with gas companies knew that coke especially, and residuals generally, during the last half year had been considerably lower in price than in the corresponding period last year.

The motion was then put and carried unanimously.

The DEPUTY-CHAIRMAN next moved the declaration of the dividends mentioned in the report.

Mr. C. LEA WILSON seconded the motion, and it was also carried unanimously.

Mr. R. J. S. BEETON moved a vote of thanks to the Directors for their able management of the Company's affairs.

Dr. PUCKLE seconded the motion, and it was unanimously agreed to.

The CHAIRMAN, in acknowledging the compliment, said the only matter on which the Directors felt any doubt was whether they ought to accept it, as they had only done their duty. Continuing, he proposed a vote of thanks to the Officers, on whom the success of the Company was in a great measure dependent, and warmly eulogized the services of the Auditors, the Engineer, the Secretary, and Mr. Arliss, the Chief Clerk, referring to the great interest taken by Mr. Ohren in local affairs, and the esteem in which he was generally held.

Mr. R. H. JONES, in seconding the motion, thanked the Deputy-Chairman for replying to the observations he had made.

The motion was carried unanimously.

Mr. JAMES GLAISHER, F.R.S. (one of the Auditors), responded, and said he certainly thought that the officers did their best. He would like to take this opportunity of saying that where gas was scarce it was valued at a high price. When he was at Grasmere recently he asked what was being paid for gas, and was informed that it cost about 12s. or 14s. per 1000 feet. His informant added that he would use it, even if it cost more, on account of its cleanliness, safety, and other advantages.

A vote of thanks to the Chairman was then passed and acknowledged, and the proceedings terminated.

BRISTOL UNITED GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held on Wednesday last—Mr. F. TERRELL in the chair.

The SECRETARY (Mr. H. H. Townsend) having read the notice convening the meeting, the Directors report (which recommended a dividend at the rate of 10 per cent. per annum), together with the half year's accounts, was presented.

The CHAIRMAN, in moving the adoption of the report, referred to the loss the Directors had sustained by the death of Mr. T. T. Taylor, who had been upon the Board of the Company for 16 or 17 years, and during the past five or six years had filled the post of Deputy-Chairman. The vacancy thus caused had, he said, been filled up by the appointment of Mr. W. Spark to the office. Mr. Spark was well known to all the Proprietors, and his business habits induced the Directors to believe that they would get on as well as they had hitherto done. The accounts before the meeting showed a falling-off in the gas revenue for the past half year, but this might be accounted for by the reduction in the price since the 1st of January. The Directors always found, as a natural consequence of their making a reduction in the price of gas, that their receipts for the ensuing half year diminished. The reduction had been made to the general consumer as well as to the Sanitary Authority for the public lamps, and he had no doubt the deficiency that had arisen would be again made up in the current half year. At the new works at Stapleton a large tank had been erected. He had always been of opinion that two gasholders would be better than one there. It was not impossible, although improbable, that some accident might arise; but if anything happened to one of the gasholders they would now have another ready for any emergency. The demand for gas in the Stapleton neighbourhood was very great; it was rapidly increasing year by year, and had been growing to a very great extent for the last six months. Of course nothing could be done without expense, and to meet the cost of the extension of the works and other matters the Directors intended offering for sale £20,000 worth of stock.

Mr. W. SPARK seconded the motion. He was sorry he had been called upon to supply the place of Mr. Taylor, than whom there could not have been a more honourable and upright man. He hoped he should do his duty towards the Company, whose affairs were in a prosperous condition, although there had been a diminution in the last half year's receipts. He had no doubt that the winter coming on would put them in the position they were in before—able to meet all the demands made upon them in dividend and in every way.

Mr. R. W. GILES observed that the Sanitary Authority had been again raising the question as to the price of gas. The Chairman of that body seemed to have appreciated the fact that the difference was not so much between the Gas Company and the Authority as between the Gas Company and the public. The question was whether the Gas Company were charging a fair price for the gas. He thought the accounts showed that they were not charging an unfair price. With a capital of £645,000 they had earned only £15,400; that was to say, they had earned less than 5 per cent. profit upon their returns last half year, which clearly showed that they were not behaving unfairly towards the consumers. It could not be too often put before the public that the Company were not charging an unfair price, or receiving undue returns for the capital invested. If one was not allowed to get 5 per cent. out of a successful enterprise, there might as well be an end of public enterprise altogether. He regretted that the Directors did not intend to fill up the vacancy in the directorate caused by the death of Mr. Taylor. He should like the Board to consist of 10 or 12 members, because that would give the public greater confidence in dealing with the question of the public lights. He hoped, therefore, the Directors would see their way clear to fill the vacancy as quickly as possible.

The CHAIRMAN said the reason why the vacancy had not been filled up was because it was generally found that the business was better done by a small number.

The motion was carried unanimously, and the dividend recommended was declared.

The retiring Directors, Messrs. F. Terrell and J. Lucas, were re-elected, and Mr. W. Tribe was again appointed Auditor.

The proceedings closed with the customary compliment to the Chairman.

DOVER GASLIGHT COMPANY.

The Half-Yearly General Meeting of this Company was held on Tuesday, the 7th inst.—Mr. W. R. MOWLL in the chair.

The SECRETARY (Mr. G. Fielding) read the notice of meeting, and the following report of the Directors was presented:—

We now lay before you the accounts for the period closing the third year of the conduct of the Company's business by the direct action of the Board of Directors; and we feel that the results of the working of these three years, as evidenced in the accounts, will bear a very favourable comparison with any other period of the Company's existence.

The improvements recently introduced into the manufacturing plant at Buckland have proved to be of a very beneficial character, by enabling a much larger quantity of gas to be made than formerly, without an equivalent increase of expenditure. We hope for still further results in this direction.

In addition to the reduction of 3d. per 1000 cubic feet in the price of gas which we made on the 1st of January, 1878, we have now been enabled to announce a further reduction of 3d. per 1000, as from the 1st day of July last, and this latter reduction will be extended to the public lamps on the 1st of January next, when the new three years contract which we have negotiated with the Town Council will come into operation.

We recommend the declaration of the usual dividend at the rate of 7½ per cent. per annum, and the payment of the arrears of dividend for the years 1865 and 1866, and the carrying forward of the balance of the profit and loss account.

Messrs. W. Mannering and Henry Stone retire from office as Directors, and Mr. Henry Hayward as Auditor. All three gentlemen are eligible for re-election.

Profit and Loss Account, for the Half Year to June 30, 1880.

Dr.				Cr.			
Coals	£4,367	0	7	Sale of gas, less discounts and bad debts	£10,507	5	8
Purifying	127	12	11	Coke, tar, & other residuals.	2,510	2	0
Repairs and maintenance of works, meters, mains, &c., including labour	2,568	14	2	Meter and fittings rental.	243	18	8
Wages for gas-making	818	11	3	Profits on gas-fittings and asphalting	144	13	10
Lamps—providing, lighting, extinguishing, cleaning, &c.	298	2	2				
Rents, rates, and taxes	503	0	8				
Salaries, Collector's commission, and Directors	734	18	8				
Interest on loans	195	16	8				
Incidental expenses	99	19	9				
Solicitor's charges.	3	13	6				
Balance	3,688	9	10				
	£13,406	0	2		£13,406	0	2

Balance-Sheet, June 30, 1880.

Capital raised	£60,500	0	0	Cost of works, less depreciation	£71,228	1	3
Statutory mortgages	10,000	0	0	Book debts	5,824	1	1
Premiums on new shares	7,467	8	7	Coals, coke, sundry stocks, and plant	4,11	13	9
Balances of profits account	6,651	15	3	Invested in Consols	3,275	7	6
Insurance-fund	973	15	0	Invested in Canadian bonds.	973	15	0
Deposits from consumers	365	19	9	Bankers	4,882	18	3
Sundry liabilities	636	8	5				
Balance	3,688	9	10				
	£90,303	16	10		£90,303	16	10

The CHAIRMAN, in moving the adoption of the report, said that for some few years it had been his pleasure at each meeting of the Shareholders to refer to the satisfactory progress of the Company, but on no former occasion had his remarks been more truthful than on the present. There was a time when the Company was regarded as a kind of social Ishmael; but these things were now altered. It had been the endeavour of the Directors, by their courtesy, to prove that in the conduct of the Company they all had interests apart from the interests of the great body of their fellow-towusmen; yet standing there, the mouthpiece of the Company, and then considering himself as one of the community, he was not conscious of there being anything like a clashing of those interests. Turning to the balance-sheet, the Shareholders would see that the Directors had expended £2568 14s. 2d. on repairs and maintenance of works. A large proportion of this sum had been laid out in the renewal of plant, necessitated by the advances which science had made, for improved methods of gas manufacture were constantly being devised. The growth of the Company had been most marked, for while in the year 1877 the total quantity of gas manufactured was 97,160,400 cubic feet, during last year 111,736,500 feet were sold, showing an increased consumption of gas amounting to 14½ million feet over the year 1877. In addition to this, whereas two or three years ago only about 9400 feet of gas could be made from every ton of coal carbonized, in the past year the average quantity obtained per ton had been 10,060 feet. This had been owing to the

improvements effected in the plant, and in this direction the Directors were constantly endeavouring to advance. On referring to the credit side of the balance-sheet, the Shareholders would notice that £2510 2s. had been received from the sale of residuals. Dover was not a favourable place for disposing of coke, and hence it was that the sum so received was perhaps not so large as in some other companies more favourably circumstanced in this respect. However, the Local Board had again accepted the Company's offer for the supply of fuel to the water-works. Their having done so had, he was satisfied, saved the town at least £200. It would be noticed that the total amount of the Company's capital had reached £90,000, and as he looked at this and at what the Shareholders possessed in the shape of works, he could fearlessly say they had a magnificent property. Three years since there was no reserve-fund. Now they had a reserve of £3275 7s. 6d., and had formed the nucleus of an insurance-fund to the extent of £973 15s. This fact had not been mentioned in the report, simply because the investment had taken place since the last meeting. The Manager reported that there was at the bank some money he did not want, so the Directors proceeded to invest it; and the amount so invested during the past half year was £473 15s. The Shareholders would notice that the Directors recommended the declaration of the full statutory dividend at the rate of 7½ per cent., and also purposed paying the arrears of dividends for the years 1865 and 1866. They could accomplish all this and carry forward £190 14s. 11d. It must be distinctly understood that this payment of arrears should be considered in the shape of a bonus, because, inasmuch as the Directors had reduced the price of gas 3d. per 1000 feet, the surplus profit during the next six months would be considerably lessened. However, he felt fully justified in saying that the Shareholders would continue to receive their full dividend, and possibly something on account of arrears.

Mr. BOTTLE seconded the motion, and it was carried unanimously.

The retiring Directors and Auditor were then re-elected, and the proceedings closed with a vote of thanks to the Chairman and Directors for their services during the half year.

FALMOUTH GAS COMPANY.

The Annual General Meeting of this Company was held on Friday, the 3rd inst.—Mr. R. M. TWEEDY in the chair.

The SECRETARY (Mr. R. J. Lukey) having read the advertisement convening the meeting, the report of the Directors was presented.

The report stated that the works generally were in thoroughly good repair, but additions and improvements were being made in them. The Directors called attention to the advantages to be derived from the use of gas for cooking and heating purposes. The number of consumers was steadily increasing, the quantity of gas sold during the past year having exceeded by more than 500,000 cubic feet that sold in the previous year; while at the same time the leakage had diminished by nearly 2 per cent. With the hope of inducing a larger consumption of gas, the Directors proposed to reduce the price to 4s. 2d. per 1000 feet from the 29th inst., with a discount of 10 per cent. for prompt payment, making the net price 3s. 9d., or 4d. per 1000 feet less than that now charged. The Directors recommended the declaration of a dividend of 5 per cent. per annum, and a bonus of 6d. per share, in addition to the interim dividend of 5 per cent. paid in February last, also the presentation of a bonus of ten guineas each to the Secretary and Manager, for their attention to the interests of the Company. The profit and loss account showed receipts from the sale of gas, £3424 15s. 8d.; coke, breeze, and tar, £650 10s.; meter-rents, £248 2s. 6d.; ammoniacal liquor £102 7s. 3d.; rent, £80; fittings and miscellaneous, £35 17s. 1d.—total, £4541 11d. 6d. The expenditure was—coal, £1236 16s. 10d.; wages, £349 6s.; purifying materials, £24 7s. 10d.; rates and taxes, £183 9s. 4d.; salaries, £275; repairs and depreciations, £768 9s. 8d.; bad debts and miscellaneous, £93 3s. 10d.—total, £2930 13s. 6d., showing a profit of £1610 18s. on the year's working.

The CHAIRMAN, in moving the adoption of the report, said it might be justly considered as the best the Directors had ever sent out. The Company had been established 15 years, and although they had had difficulties and a good deal of uphill work to contend with at the outset, they were now in a profitable position. The works were in thoroughly good order, and the machinery in first-rate condition. A new governor and also a new photometer had been fitted up, and the Directors had obtained one of Kirkham's "Standard" Washer-Scrubbers, which he hoped would be efficacious in the purification of the gas. Gas had not been so much used for cooking and heating purposes as the Directors could have wished; but he would again impress upon the public the advantages that were to be derived from it. Some people in the town complained that they could not get sufficient pressure of gas in the daytime to enable them to use gas-stoves; but there was now sufficient pressure at all times, and he hoped these stoves would soon come into more extended use than they were at present. The consumers of gas were steadily increasing, although perhaps not so rapidly as the Directors could desire. There had been a vacancy in the list of Directors, caused by the death of Mr. Selley, and it was not proposed that that vacancy should be filled up. On one or two occasions a desire had been expressed that the number of Directors should be reduced, and this was considered to be a fitting opportunity for meeting the wishes of the Shareholders on this point. The Directors had on the present occasion added to the dividend by way of a bonus, and had also decided to lower the price of gas to the consumers. This, perhaps, might be considered by some to be rather a bold step to take, seeing that the price of coals was increasing; but, looking at the present state of the works, they considered that they could supply gas at 3s. 9d. per 1000 feet, and give to the Shareholders quite as good a dividend as they were now receiving. This price was certainly lower than that charged in any other town in the West, and, with the exception of Plymouth and Devonport, he believed there was no other town in Devonshire or Cornwall supplying gas at so low a rate. The success of the Company depended, of course, to a very great extent, on their Manager (Mr. F. M. Harris), who was most attentive and arduous in carrying out his duties. In recognition of his services the Directors had voted him ten guineas, and a like sum, for the same reason, to their excellent and hard-working Secretary.

Mr. HANDCOCK seconded the motion, and it was carried unanimously.

The retiring Directors and Auditors were then re-elected, and the proceedings terminated with the customary vote of thanks to the former.

LEWES GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Monday, the 6th inst.—Mr. E. MORRIS in the chair.

The SECRETARY (Mr. E. Hillman) read the report of the Directors, which was as follows:—

The Directors have to report that the working of the Company for the half year ending June 30, 1880, has been satisfactory. The balance on the revenue account amounts to £1263 1s. 11d., and the Directors recommend that £52 18s. 1d. be taken from the profit and loss account, making together £1316, thus enabling them to declare a dividend at the rate of 5 per cent. for the past half year upon the capital of the Company.

The alterations at the works and the covering of the yard have now been finished, and the Directors have the satisfaction of reporting that at a comparatively small cost they have much improved their premises, making them suitable for the better manufacture of gas, the profitable conversion of residuals, and the increased business of the Company. The cost of the new retorts and the alterations at the works, added to the greater amount required for the new tank and gasholder, will much increase the capital of the Company; the Directors, however, are satisfied that the outlay will ultimately increase the security and prosperity of the Company.

The Directors are now paying attention to the state of the mains and services throughout the town, with a view to effect a saving in the loss of gas through the leakage in old mains and services. They have reason to expect a considerable gain will thereby be made, which will amply repay the cost of the inspection.

The Directors who go out of office this year are Messrs. John Bates, John Latter Parsons, and Henry Bonnick, who are all eligible for re-election, and they offer themselves accordingly. Mr. Richard Lambe also goes out of office as Auditor, and is eligible for re-election.

The CHAIRMAN, in moving the adoption of the report, said he hoped the Shareholders would agree with the Directors that it was a satisfactory one. During the past year the Directors had had a great deal of extra work to attend to, but, so far, they had overcome their difficulties. The alterations at the works were nearly completed, and although they had involved considerable expense, he believed they would prove very beneficial to the Company. The Directors had found it necessary to take steps to prevent leakage in the mains. The quantity of gas made from the coals used was very satisfactory, but the quantity conveyed to the customers was not so satisfactory, in consequence of great leakage that took place from the mains. The old pipes were laid down 57 years ago, and had consequently undergone a considerable amount of wear, but the laying of gas-pipes then was not so efficiently accomplished as now. The Directors had made a good contract for coals, to run for three years to come. He considered the position of the Company, on the whole, very favourable, and the Shareholders might be satisfied that their interests were protected and quite safe.

Mr. CROSSKEY seconded the motion.

Mr. GODLEE said he united in the hope, and very much in the trust, of the Chairman, that the great outlay of late had been wisely and usefully spent. The state of the works would show that the alterations had been carried out in a highly satisfactory manner. With regard to the accounts he had the highest confidence in the Directors and Auditors; and while he had that confidence and the Company paid him 10 per cent. he should be satisfied.

The motion was carried unanimously.

On the motion of Mr. GODLEE, seconded by Mr. BROAD, the dividend recommended by the Directors was declared.

The retiring Directors and Auditor were then re-elected, and on the motion of Mr. GODLEE, seconded by Mr. MORRIS, the remuneration of the former was increased from £150 to £200.

A vote of thanks to the Chairman concluded the proceedings.

LEWES WATER-WORKS COMPANY.

The Annual General Meeting of this Company was held on Thursday, the 9th inst.—Mr. E. MORRIS in the chair.

The Directors report, which was taken as read, was as follows:—

The accounts of the Company for the year, which closed at Midsummer last, having been balanced and audited, the Directors forward an abstract thereof to the Shareholders. It will be found that the receipts for the year were £2471; that the payments made out of that sum, including the irrecoverable rents (£11 1s. 1d.) and also the deductions for empty houses (£26 5s. 3d.), were £1063 3s. 7d.; and that the amount for distribution is £1407 16s. 5d. The receipts for such year show an increase over those of the previous year of £116 19s. 1d., whilst, notwithstanding an increased outlay to earn the additional income, the ordinary expenditure for the year just ended is less than that of the previous year by £25 10s. 8d. This satisfactory condition will, doubtless, commend itself to the Shareholders without any remark from the Directors. As the sum of £120 will be required for payment of the preferential dividend due to the preference stockholders, £1287 16s. 5d. will remain available for payment of the dividend upon the ordinary shares. The Directors have much pleasure in recommending that a dividend of 10 per cent. be paid upon the original share capital of £6000, and 7 per cent. upon the new share capital of £9120. Such respective dividends will absorb the sum of £1238 8s., and £49 8s. 5d. will remain to be carried to the reserve-fund, which will then amount to £157 18s. 10d.

The Shareholders will perceive from the abstract of accounts that a sum amounting to £323 18s. has from time to time been advanced on account of capital in laying down new mains where, in extending the works, the same have been required. The Directors consider that the time has arrived for providing for the payment of such sum and in furnishing the means to enable them, as occasion arises, to meet the frequent demands for new mains to be laid down, and they therefore recommend that a call of £1 be made in respect of each of the 480 new shares which were created at a meeting of the Shareholders held on the 5th of October, 1868, and upon each of which a sum of £19 has already been paid.

The whole of the machinery and works belonging to the Company are reported by the Manager to be in good condition.

The retiring Directors this year are Messrs. Ebenezer Morris and George Lenny, who, being eligible for re-election, offer themselves accordingly.

The CHAIRMAN, in moving the adoption of the report, said he hoped the Shareholders would not think the Directors had presumed too much in speaking of the accounts as being satisfactory. They would see by the report that the Directors proposed giving them an additional 1 per cent. upon the original share capital, and still carry the same balance to the reserve-fund. The Directors had come to the conclusion that it was desirable to call up £1 per share upon the 480 new shares. This would put them in the possession of capital sufficient to enable them to carry on satisfactorily the business of the Company, and prevent the necessity of that balance being put to the capital account. The whole of the machinery and works were reported by the Manager to be in good condition. Though the dividend itself was satisfactory, he derived greater gratification from the fact that the Company were instrumental in supplying the town with such a good and constant supply of pure water, which was one of the elements of life, and it would certainly be the duty of the Directors to continue to supply the town in the satisfactory way they had hitherto done. He noticed that in some parts people were complaining of the want of water, and of the indifferent quality supplied. It must, therefore, be a satisfaction to the Directors of this Company to know they supplied a first-rate article, and supplied it in abundance to their customers, and that every necessary measure had been taken to be prepared for any calamity by fire.

Mr. CROSSKEY seconded the motion, and after some conversation it was agreed to.

On the motion of Mr. CROSSKEY, seconded by Mr. BROAD, it was agreed that dividends at the rate of 5, 7, and 10 per cent. respectively on the several classes of shares, be declared; an amendment to the effect that "in addition to such dividends the further sum of 1 per cent. be paid to holders of the original shares of £6000, as making up a deficiency of the dividend paid to them in the previous year," having been lost by the casting vote of the Chairman.

On the motion of the CHAIRMAN, seconded by Mr. BROAD, it was unanimously agreed that a call of £1 be made in respect of each of the 480 new shares of the Company created on Oct. 5, 1878.

A vote of thanks having been given to the Directors for their services during the year, those retiring by rotation were re-appointed, and an addition of £20 was made to the amount set apart for their remuneration. The Auditors, Messrs. Parsons and Hillman, were also re-elected, and the proceedings closed with the customary compliment to the Chairman.

THE POLLUTION OF THE THAMES FROM THE WINDSOR DRAINAGE.—On Saturday, the 11th inst., before the Magistrates for the Windsor division of the county of Berks, the Solicitor to the Thames Conservators applied for a summons against the Urban Sanitary Authority for the Borough of Windsor for causing foul matter to flow from the Windsor drainage works at the Ham, at Old Windsor, into the Thames. The summons was granted, and was made returnable in a fortnight.

SOUTH-WEST OF ENGLAND DISTRICT ASSOCIATION OF GAS MANAGERS.

The Sixth Half-Yearly Meeting of this Association was held at the Gas-Works, Southampton, on Tuesday, the 14th inst., under the presidency of Mr. S. W. Durkin, the President.

[Before entering upon the business of the meeting, the members were conducted round the works by the President, and a very profitable hour was spent in their inspection.]

The Honorary Secretary (Mr. T. W. R. White, of Sherborne) read the notice convening the meeting, and the minutes of the previous meeting, held at Taunton on the 9th of March, and they were confirmed. He then read the names of five applicants for membership—viz., Mr. R. K. Moorhouse, Andover; Mr. G. Stallard, Havant; Mr. S. Samuel, Totnes; Mr. M'Gregor, Ringwood; Mr. J. G. Livesay, Ventnor—and these gentlemen were unanimously elected.

The President said: Gentlemen, I have much pleasure in seeing you at these works, where I have spent 25 years of my life. I am also desired by the Chairman and Directors of the Southampton Gas Company to express their good wishes towards the Association, and to say they hope we shall have a successful meeting. It is not usual at our September meeting for the President to deliver an address, and, therefore, no apology is needed because I have not prepared one. Still there are one or two matters to which I should like to call your attention. Our legislators, who hedge us about with Acts of Parliament, have just passed a Bill, entitled the Employers Liability Act, 1880 (43 & 44 Vict., chap. xlii.), which increases our responsibilities, in our position as employers of labour. The Act does not come into operation until Jan. 1, 1881, and I recommend every gas manager to procure and study a copy of the Act. The electric light is making some little progress, but not, I think, in any way likely to affect the interests of gas companies. I notice that Messrs. Bass and Co., the well-known brewers, are about to introduce it at their works. We are going to make a trial of Sugg's system of street lighting in Southampton. The lamps will be of the "Lambeth" pattern, and there will be eight 50-candle burners, and one 80 and one 100 candle burner at the cross roads. This will show the Municipal Authorities what gas can do in the way of street lighting, and will, I hope, awaken them to a sense of the importance of having the streets well lighted. Mr. Sugg has also recently introduced a street-lamp regulator, for securing a constant consumption of gas. [A sample was handed round for the inspection of the members.] In ordering it the required consumption per hour must be stated, and it will be sent regulated to the quantity.

Mr. T. Stone (Weymouth) then read the following paper on

THE EXTENSION OF GAS SUPPLY TO THE MASSES.

I believe there is no matter connected with our profession which has been so much neglected by gas companies as that which forms the subject of my paper. Look where we will, we find that nothing pays so well as catering for the masses of the people, and we have the humiliation of noting that almost everywhere, where the people are peculiarly cared for in commerce, it is by those who have to combat with keen competition, and who possess no monopoly such as we, or most of us, have.

To my mind this is highly discreditable, as it seems to suggest that nothing is cared for but satisfactory dividends to shareholders where the fault lies at the door of the directors, and a love of ease where it lies at the door of the manager. In saying this, I willingly grant that much increased labour, anxiety, and responsibility rests upon the manager, which he has no manner of interest in assuming, except a high sense of duty in carrying out the true principle of a regulated monopoly in the spirit in which it was designed and granted by Parliament, which appears to me to consist in this—that always assuming fair management, a good dividend upon invested capital is secured, or practically so, by Parliament, so long as certain duties to the public, which Parliament imposes as the penalty of monopoly, are faithfully discharged. I need only refer you in proof of this to numerous clauses in Acts of Parliament under which most of us are working; they are numerous, explicit, and distinct.

Now, how do we discharge those duties to the public? Mainly by supplying those persons with gas who apply to us for it. "Well," it may be said, "that is just what tradesmen do." Just so; but they do infinitely more; they employ representative men to go out and solicit business. I fancy I hear some one say, "What! gas companies? I go out *touting* for business! Not if I know it." Well, I confess I see no objection to it, where time and opportunity admit of it, such as in small places where the manager's time is not otherwise fully employed, and where his time is fully employed, then, like a tradesman, he may consider whether it is not well to employ a representative to perform the service. Successful men of business have done so, and why should not I? In addition to personally soliciting business, tradesmen advertise freely. I admit that here we are, as a body, redeeming our characters, for we are beginning to advertise our wares, and in some measure to attract the attention of those for whom we exist; but hitherto this has been on a most meagre and limited scale, confined mostly, if not entirely, to large companies or corporations owning gas-works, and who have had enterprise enough to organize exhibitions of gas-stoves and other apparatus, which in the particular districts have resulted in so much increase of business, and which has had the double effect of reducing the price of gas to the public and consolidating the dividends of the companies in the one case, and the reduction of the improvement or sanitary rates in the other; which latter case I cannot forbear characterizing as an illegitimate use of profits which have been derived from a part for the benefit of the whole of the public.

About twelve months ago I conceived the idea of scheduling every house in my district, of whatever quality, which had no supply of gas, believing that if a householder, however poor, could afford to use artificial light at all, he could afford to use gas, as being at once the most cleanly, convenient, comfortable, and inexpensive lighting agent. Accompanied by an assistant, I accomplished about one-half the district, and as I had no opportunity of completing the whole before my then next meeting of Directors, I broached the matter to them, but did not find sufficient encouragement to warrant my proceeding with the remaining half of the district; only the sense of having done what I believed my duty prevented my regretting that I had put myself to so much pains, weariness, and labour which it involved.

I discovered in my perambulations that in about half, or perhaps something more than half of my district, there were 739 houses having no supply of gas; and assuming they all had a supply, I put a very low estimate upon them, viz.:—

1	at	£30	0	per ann.	4	at	£1 15 per ann.
72	,,	4	0	,,	92	,,	1 10 ,,
20	,,	3	0	,,	45	,,	1 5 ,,
1	,,	2	15	,,	341	,,	1 0 ,,
21	,,	2	10	,,	114	,,	0 15 ,,
27	,,	2	0	,,	1	,,	0 10 ,,

The gross amount was £1140 5s., and it cannot be supposed that once these houses obtained a supply of gas they would confine their consumption to such narrow limits as those indicated; but I preferred to err on the safe side. Had the whole district been so scheduled, I have no doubt I should have tabulated at least 1200 houses, estimated to produce a revenue of £2000 per annum. I do not for a moment suppose that, however strenuous the endeavours made to extend the supply in this direction, it would receive the favour of every householder, but I do believe it would of a very large number—quite sufficient to warrant gas companies in making the attempt.

I propose, in the first place, to offer householders every facility to purchase gas-fittings at a very cheap rate—at prime cost if necessary—also gas cooking and heating stoves, and where they will not purchase them let them out on hire at a rental sufficient to cover interest on outlay and depreciation of plant. This I would extend to every description of gas-fittings, and stoves for heating and cooking; but for gas-engines it would probably be impracticable, in consequence of the great cost of those engines. I contemplated, had my Directors supported me, making an experiment with a terrace of 22 workmen's cottages above the average of respectability. I estimated that I could erect gas-fittings for lighting three rooms—kitchen, sitting-room, and bed-room—and put in a small cooking stove capable, of cooking an artizan's family dinner, at a prime cost of 40s., upon which I proposed to charge 10 per cent. interest; then the charge for meter hire, 4s. per annum; making altogether a fixed charge of 8s. per annum. There would be only one light in use at a time, which I reckoned at 3 feet per hour for an average of three hours per night = 3285 feet per annum. For the stove I estimated 100 feet per week for 26 weeks = 2600 feet; together, 5900 feet, or roundly 6000 feet at 4s. 6d. per 1000 = £1 7s.; add 8s., the fixed charge, and we get a sum of 35s. per annum, or 8d. per week throughout the year. I am sorry I am unable to compare this with the probable cost of oil, spirit, or candles, which cannot surely be much less than the sum named; and it must be remembered that, by the use of the stove, the total fuel account is saved for 26 weeks in the year, which would alone, I imagine, amount to the gross annual cost of gas for every purpose. That the masses of the people would hail any measures which would bring gas within their reach I do not doubt, for while spirit lamps have been brought to a high state of perfection, they are often the cause of much damage to property, and not seldom of loss of life, while at best they are very troublesome to trim and clean daily, and the number of glasses broken is legion.

I presume none of us here would object to the great increase of revenue such an extension would bring us. What, then, are the objections to such an extension? The gravest that I have ever heard is that it would lead to a large increase of bad debts, and that the trouble of collection would be enormous. I will grant all this to a large extent. Doubtless the trouble would be great, but, after all, that is only a matter of cost—either an increase of salary to the collector, or the allowance of some assistance. Bad debts would probably be more than were averaged before, but I believe myself not to anything like an extent to warrant the quashing of the matter.

I thought some years ago of endeavouring to get a meter made which should be simply read, and be capable of registering the hundreds and tens, and having them read monthly for small houses, and the payment made in smaller amounts, to meet the fair objections raised that poor people will not save up their money to pay the gas account, but would not mind paying so many pence per week. This is an objection I pay more attention to than any other; but I fear making a distinction between Mr. A., a respectable artizan, and Mr. B., an ordinary labourer, who are neighbours, would create a great sentimental grievance. Mr. B. would say, "Why am I made to pay every week or month, as the case may be, while you trust Mr. A. for a whole quarter?" and one would be hard put to to make a reasonable reply. But it really ought not to be forgotten that every one of us has at the present time a considerable number of such customers already. What is our experience? If I may judge from the reports of several gentlemen here who favour me with their published statements of account, their bad debts are very small indeed, and I venture to think they do not arise altogether, nor even mainly, from such customers as I plead for. Objections there are, and I do not shut my eyes to them, but the advantages of extending, and largely extending, our business in the direction indicated far outweighs, in my judgment, any objections that may be urged against it. If my professional brethren are daunted in their enterprise by such obstacles as I have named, or by others which I have not named, but which will probably be raised on the discussion upon this paper, then I confess I am utterly mistaken in them.

It is perfectly well known that nothing retards a reduction in the price of gas so much as a stagnant business, while with a progressive business the invariable accompaniment is a diminished price, and that again, in its turn, stimulates increased business, and so on. I believe, gentlemen, when the day comes—which I hope may not be in my time—that gas managers, from a love of ease and personal comfort, shelve these difficult questions instead of standing up and struggling with and overcoming them, they will be set aside to make room for a more enterprising body of men who will grapple with opposition and obstacle and subdue them. Do not for a moment suppose I am capable of doing my brethren the injustice of laying this blame of lethargy at their door. From all my knowledge and experience of them they are blameless. We must, I fear, look farther, and lay it down at the door of either a timid or over-cautious directorate. I have learnt to look upon maximum dividends as not an unmixed good; it tends to enervation and a "rest-and-be-thankful" spirit, good enough in its way, but often very contemptible in its operation.

Gentlemen, I hope I have not wearied you. I look for the day when every cottager shall be furnished with our staple article for lighting, heating, and cooking, which will enormously increase our business, consolidate our interests, and make them rest upon the foundation of a satisfied public—an animal some of us are prone to think never had anything but a mythical existence, or else passed away long ages ago, and of which no trace has ever been discovered by the most eminent scientists. The extension indicated in this paper must tell also upon existing consumers, and so instead of complimenting ourselves that our business had not suffered from retrogression, or proudly pluming ourselves upon a 3 per cent. increase, we should, in the course of a very few years, double, treble, and even quadruple our business, for many a house would use much more gas for cooking and heating than for lighting purposes; and in the course of time who shall say but even in provincial towns, such as that I have the honour and pleasure of representing, gas shall be furnished at 2s. 6d. instead of 4s. 6d. per 1000 cubic feet, maximum dividends upon all classes of capital paid, and the Shareholders oftener having the opportunity, now eagerly sought, of putting out their surplus cash at good interest; and, as a natural concomitant, the manager receiving his share of the advantages derived by all other classes—a matter, by-the-by, too often lost sight of amid, or swallowed up in the satisfaction experienced in the declaration of good dividends, the production of which he has not been altogether blameless in effecting.

Discussion.

The President, in inviting discussion on the paper, said that gas was only used to a limited extent among the poorer classes in the South of England.

Mr. T. Hardick said that on a recent visit to the gas-works and offices of the Manchester Corporation, he was surprised to find that they had some

thousands of small accounts on their books, some of which were collected weekly, others monthly; and yet the amount written off as "bad debts" was very small. Being a Corporation, they could do as they pleased in the matter of payment, and it was the invariable rule to demand a substantial deposit, according to a fixed scale, or an approved guarantee. Accounts unpaid were handed over to a distinct class of collectors, whose sole duty it was to look after the arrears. Prompt payment was demanded, and the supply cut off, at a week's notice, if the account was not paid. This was one way of dealing with a difficulty often met with even when deposits in advance were the rule. Consumers would, if allowed, sometimes get in arrear for a larger amount than they deposited in advance. The Manchester Corporation also charged a fee of 1s. for connecting or removing a meter, and the gas appeared to be very generally used. Another difficulty was that of frequent changes of tenants. He had often been obliged to go and prevent meters being disposed of by auction, and this was a serious objection to any scheme for letting out fittings on hire. A guarantee might be taken from the owners of the property to maintain the fittings entire; but there would be a difficulty in obtaining it. The Association were, he thought, much indebted to Mr. Stone for his scheme of extension, as it was a question which had more or less occupied all present.

Mr. W. U. TINNEY said he found a difficulty in obtaining payments in advance. In Scotland most of the fittings belonged to the landlords, who included a charge for them in the house-rent.

Mr. HARDICK remarked that he had endeavoured to get a guarantee from owners of property for the fittings in the event of his Company providing them, but without success.

Mr. G. GARNETT said that his experience in this matter was much the same as that of Mr. Hardick. He provided a form of guarantee to be filled up on behalf of every intending consumer, and failing this he insisted on a deposit. His rule was a guarantee, or a deposit, and he did not object to allow 5 per cent. interest on pre-payments. As soon as a tenant vacated a house, he (Mr. Garnett) sent for the meter. If firmness in carrying out this rule was exercised, the consumer soon came round to it. He was pleased to hear what Mr. Stone had said, and the President had remarked that the working classes in the South of England rarely used gas. This was because they did not possess so much intelligence, or practise so much thrift, as the poorer classes in Scotland and the North of England. In the large towns of Scotland, the "flats" inhabited by labouring people were all well lighted by means of gas; and in Manchester the workpeople's homes were to be found with plenty of gas, warm baths, and other conveniences. Those people had been educated up to it. Mr. Stone's scheme would educate the working classes in this part of the country, and beyond doubt there was a very wide opening for it.

Mr. H. SAINSBURY said that in his experience much depended upon the kind of working classes dealt with. He had some streets of small consumers who paid better than tradesmen; while some people were continually changing, and gave a great deal of trouble.

Mr. CROWE thought that the cheapness of oil, also the low price of oil lamps as compared with the cost of gas-fittings, had much to do with the limited use of gas by the poorer classes. He knew of instances where the tenants of respectable houses preferred to burn oil rather than incur the expense of gas-fittings. It would be a very good plan to carry a service into every house before the building was completed.

Mr. M'GREGOR remarked that this was always done in Scotland, and it was a general custom in that country for the gas companies to demand a deposit, if they thought such a course advisable.

Mr. T. W. R. WHITE thought that the great difficulty was the fittings difficulty. Oil lamps could, he said, be obtained for 1s. or 2s. each, while the gas-fittings, even for a very small house, would run to 30s. or £2. Many people preferred doing without gas to incurring the expense of fittings. He once canvassed a district where scarcely any gas was used, and found several cases where people would be glad to use gas, but did not feel inclined to go to the expense of fittings. He proposed to his Directors a scheme for letting fittings on hire, but they would not agree to it.

Mr. CROWE said, with regard to bad debts, the poorer classes in his district generally paid their accounts promptly, and he had no difficulty in getting the money. His losses were oftener among those who had the means and ought to have paid. A short time previously he laid on gas to a village inhabited by poor people, and his Directors were opposed to this being done, on the ground that the bad debts would be large; but he had not yet lost anything in the district. Mr. Stone's paper would be very useful, for though it was almost impossible to carry out in full the scheme he proposed, there were many very good hints. The remark that gas companies supplied gas only when it was asked for was, he thought, very pertinent.

The PRESIDENT said that the expense of pipes and fittings appeared to be the principal obstacle to the extended use of gas among the poorer classes. His own rule was not to lay a main in a new district until pipes were put into the houses, and he generally took a deposit, because there were so many changes of tenancy in his district. A reduction in the price of gas tended to induce an increased consumption.

Mr. H. COCKEY remarked that the Bristol United Gaslight Company usually demanded a deposit.

Mr. N. H. HUMPHRYS (Westbury) read the following paper:—

A FEW REMARKS ON LIME FOR PURIFYING GAS.

Our attention has lately been drawn to the subject of lime as used for purifying gas. Mr. William Foster spoke on the chemistry of spent lime, at the recent meeting of the British Association of Gas Managers; and within the last few weeks Mr. A. F. Wilson has given an account of Hislop's process for revivifying lime, at the meeting of the Southern District Association of Gas Engineers and Managers. I have therefore thought that a few remarks on the subject of lime would be of interest.

Commencing with the mineral substances from which lime is obtained, in passing we may notice that above 600 varieties of limestone are known, and they vary greatly in physical properties. There is the beautiful Bolsover magnesian limestone, of which the walls of our present Houses of Parliament are built; and there is the marly mud used for building walls, and sometimes cottages, by the peasants of Salisbury Plain. The term limestone is applied to any mineral containing more than about 50 per cent. of lime, which, almost without exception, exists in the form of carbonate of lime. If we submit carbonate of lime to a bright red heat, the carbonic acid and lime part company, the carbonic acid passing away in the form of gas. When a limestone is submitted to a red heat in a kiln, the carbonic acid is driven off, and the pure lime, together with the earthy impurities, which are but little affected by the heat, remains behind. The lime burners speak of "poor" or "rich" limestone, according to the percentage of lime contained in it. A poor limestone contains 60 or 70 per cent.; a rich limestone 80, 90, or more, per cent. of carbonate of lime. Carbonate of lime contains 44 per cent. of carbonic acid, so when a limestone containing 75 parts of carbonate is submitted to the action of the kiln, 33 parts of carbonic acid go off as gas, leaving behind 42 parts of lime and the 25 parts of earthy impurities. Hence the limestone loses weight in the kiln, and 100 parts of limestone yield from 60 to 75 parts of lime.

The lime is heated, or, to use the common term, "burnt," until it "slakes" readily when water is thrown upon it, so as to be suitable for builders purposes. The time occupied in slaking, and the increase which takes place in its bulk during the operation, afford some indication of its quality. If more than 80 per cent. or so of pure lime be present, it slakes rapidly, and increases to more than double its original bulk. The less lime it contains the slower it slakes, and the less it increases in bulk. It is easy to test how much water a sample of commercial lime will take up in the operation of slaking, and we can thus obtain an indication of the amount of pure lime therein contained. The first thing is to ascertain whether the sample is completely burnt—that is to say, whether the whole of the carbonic acid has been driven off. In the case of a poor limestone, this must be done before the lime is considered to be fit for use by the builders; but a rich lime, while sufficiently burnt to satisfy the requirements of these constructive artists, may contain as much as 5, 7, or even 10 per cent. of carbonate of lime. This matter is important to us, since carbonate of lime is utterly inert as a purifying material, and I dare say that where lime is burnt specially for the use of large gas-works, this point has received attention; but it happens that the larger portion of the lime purchased for gas purifying is prepared in the ordinary way, as for building purposes. There are two ways in which we can satisfy ourselves whether the lime is thoroughly burnt. One is by raising a sample, fresh from the kiln, to a strong red heat for an hour or two, and observing if any loss of weight takes place; the other is to stir a few grains in a little water, and add a few drops of strong acid, when any carbonic acid contained in the sample will be displaced, and produce effervescence. If there is a strong evolution of carbonic acid, it will be worth while to arrange with the lime burner that the lime for purifying shall have a little longer sojourn in the kiln.

I have brought with me a sample of lime which bears a very good character both for building and gas-purifying purposes, which I will proceed to test with acid. [Mr. Humphrys tested a sample, and it gave a slight effervescence.] Another sample containing 5 per cent. of carbonate effervesced strongly. I next proceed to show that lime should be delivered at the works as soon as possible after it is drawn from the kiln, and used in the purifiers as soon as possible after it is delivered at the works. If lime is exposed to a moist atmosphere for any considerable length of time, it increases in weight by absorbing moisture and carbonic acid. A few minutes since I poured some solution of lime into this beaker, and you see it has already become cloudy, in consequence of absorbing carbonic acid from the air; if left for a few days the whole of the lime contained in the solution would be changed into carbonate. This illustrates the process that takes place, though in a much less degree, when dry lime is exposed to moisture and air. The moisture does no positive harm, but it makes weight, and it is not worth while to buy moisture at the price of lime; but carbonic acid kills the lime as far as purifying is concerned; every pound of carbonic acid renders inert about 1¼ lbs. of lime.

Having tested the lime for carbonic acid, it can be tested with water, to see how much it will take up in slaking. From the portion which has been heated, take a convenient quantity, say, 50 grains, add about an equal weight of distilled water; after allowing it to stand for some time, dry it in a sand bath, or otherwise, and submit it to a temperature of 300° or so for an hour or two, then weigh; 50 grains of pure lime will take up and chemically combine with 16·075 grains of water, and with these data, and the increase of weight in a given quantity, the percentage of pure lime can be calculated. I place on the table for your inspection a little apparatus used by myself for the purpose of drying lime, or any other material. [Apparatus explained.]

A good sample of lime should (1) not lose weight when raised to a red heat, or effervesce strongly with acids; (2) it should absorb a reasonable quantity of water in the act of slaking; (3) it should slake briskly, and increase considerably in bulk while so doing.

Now let us just for a moment, before proceeding further, glance at the substances which for our present purpose may be termed the impurities of lime. The most common of these are earthy, sandy, ferruginous, or magnesian matters. Argillaceous substances are objectionable, as a limestone containing them is liable to be over-burnt; the heat causes some of the constituents of the clay to enter into chemical combination with the lime, thus reducing the percentage of free lime in the product, just as carbonic acid absorbed from the atmosphere would do. And lime containing such matters is also liable to set in the purifiers, increasing the back pressure towards the end of its service, rendering the use of pick-axes necessary for its removal therefrom. The presence of magnesia increases the liability to over-burning. A moderate proportion of quartzose sand has no detrimental effect; the same may be said of iron ore.

Two new processes in connection with the use of lime for purifying have lately been brought forward. Mr. Foster has shown us that Mr. Harris can make lime do two services in the purifier, instead of only one, as usually obtained. Mr. Hislop proposes to go farther still, and restore the lime to its original condition any number of times, thus making it "beautiful for ever" to the gas manager's eyes. Mr. Foster, while remarking on the chemistry of spent lime, on the occasion referred to above, brought out one very interesting and important fact. I refer to the presence of free sulphur in the used lime, which warrants us in concluding that lime, to a small extent, undergoes an analogous oxidizing process to that we obtain with oxide of iron. I need not remind you that lime is similar in one respect to oxide—they are both compounds of a metal and oxygen. Oxide consists of iron and oxygen; lime, of calcium and oxygen. Calcium and oxygen are such close friends that it is very difficult to separate them. The process of obtaining the pure calcium is so complicated, that although lime is so common, calcium is very rare, and 20 to 30 times more expensive than gold. I place on the table a small fragment of this interesting metal; if exposed to the atmosphere it would instantly become lime.

I have observed that if the hand be held over the stream of gas issuing from the opened test cock, the purifier being just put into use, it feels cool; as the contents of the purifier gradually become charged with impurities, the stream of gas feels warmer, and when it feels decidedly warm to the hand the purifier requires to be turned off, as the gas will stain the test paper. This shows that the lime in the purifier gradually increases in temperature, and I think an important item in Mr. Harris's process is the cooling of the lime. I am at present giving this subject further attention.

The process patented by Mr. Hislop consists of restoring the lime, in a chemical sense, to its original condition as limestone, by displacing any sulphur compounds in it by a current of carbonic acid gas contained in the furnace gases. The whole of the lime is thus converted into the form of carbonate, the same as it existed in the original limestone. It is then reburnt, or raised to a bright red heat, just as in the kiln, and quick lime is obtained. The value of this process at any particular works is very easily ascertained. From the cost of the quicklime deduct the amount received for spent lime, and the net cost per ton is thus obtained. In my own case, at Westbury, this is about 10s. per ton. We are told that Mr. Hislop's process will restore lime for about 6s. 3d. per ton complete. But the lime must be burnt as soon as possible after leaving the purifier; for if spent lime be exposed to the atmosphere for any length of time, the sulphur becomes fixed, so that it is not displaced by

carbonic acid or by a red heat. It appears to me, therefore, that this process can only be adopted where the quantity of lime in use for purifying is sufficiently large to keep the apparatus constantly in use.

The subject of avoiding nuisance in the process of removing spent lime is interesting; but I have already occupied a considerable portion of your time.

Discussion.

Mr. G. GARNETT said it was all very well to be reminded of first principles—about carbonic acid, and so forth. He found the great difficulty in regard to lime was to induce people to use it wet enough and thick enough. There was no practical difficulty in using the lime in layers of 12 or even 18 inches thick; the old plan was to moisten the lime only sufficiently to make it cohere when squeezed in the hand, and to use it in thin layers. He found that by making the lime much wetter, and using it in thick layers, it would do 20 to 30 per cent. more work. The thicker layers did not increase the back pressure; at present he was using 3½ feet thickness of lime in two layers, and the difference of pressure between the inlet and outlet of the purifiers was 9-10ths. When he worked with four layers in each purifier there was a greater pressure, and he did not get so much work out of the lime. He supposed that when the lime was made moister than was the usual rule it assumed a more porous condition, and a more intimate molecular contact took place between the lime and the gas. The point he advocated was, thicker layers and the lime as moist as possible, so long as it did not become pasty. He had allowed a purifier charged with thick layers of lime to become sulphuretted, and then made it first on the series to remove sulphur, and up to the last it did not give undue pressure. He had also lifted the lid of a purifier and sprinkled the lime with water by means of a watering-pot, and the lime was improved, and seemed to receive new energy. When set to work again it removed a larger proportion of sulphur or carbonic acid than before being watered. He proved this with Mr. Harcourt's colour test. He might also remark that on one occasion, being troubled with naphthaline, he raised the lid of a 12-feet purifier, and sprinkled the upper layer with benzoline, and this proved an effectual remedy.

Mr. STONE said at one time he used to prepare the lime for purifying in the ordinary way, but had recently used it much wetter. He thoroughly mixed it until it was as nearly as possible like mortar, yet not mortar. He thus obtained better results, and the back pressure at the inlet of the purifiers, which, of course, included that of the meter and holder, was only 4·5 inches.

Mr. CROWE: Does not the additional moisture with the lime tend to harden it, and increase the back pressure?

Mr. STONE: I have not found it do so.

Mr. T. W. R. WHITE thought that the increased thickness of the layers would increase the back pressure, especially if, as was often the case, any tarry matter happened to get into the purifiers.

The PRESIDENT said he used two layers of lime, each 4 inches thick, and two layers of oxide in each purifier, and he had four purifiers in action. He had found from experience that new and old oxide, if mixed together, produced a reaction which resulted in the evolution or giving off of some of the sulphur contained in the old oxide. He therefore placed the newest oxide on the bottom layer of the purifier, and the old oxide on the top layer, the two layers of lime being between.

Mr. HUMPHRYS remarked that the experience of Mr. Garnett when he watered the lime seemed to support the opinion that the cooling of the lime was an important point in Mr. Harris's process.

Mr. GARNETT said everybody knew that the cooler the purifying material was the better it acted.

The PRESIDENT announced that the results of the voting papers for the election of office-bearers were as follows:—*President*, Mr. G. Garnett; *Vice-President*, Mr. Henry Cockey; *Members of Committee*, Mr. W. Upton Tinney and Mr. W. C. Rafarel; *Honorary Secretary and Treasurer*, Mr. T. W. R. White; *Auditor*, Mr. H. Sainsbury. These gentlemen were therefore unanimously elected, and briefly returned thanks.

It having been agreed to hold the next meeting of the Association at Ryde, votes of thanks were passed to the President and to the Honorary Secretary and Treasurer, and the proceedings terminated.

The members afterwards dined together.

NORTH OF ENGLAND GAS MANAGERS ASSOCIATION.—A meeting (the seventh half-yearly) of the members of this Association will be held on Saturday, the 2nd prox., at Sunderland, under the presidency of Mr. J. H. COX. A paper will be read by Mr. J. T. Jolliffe, on "The Utilization of the Waste Heat from the Retort Flues for the Generation of Steam;" and one by Mr. W. J. Warner, entitled "Notes on the Work of Purification." The Chairman and Directors of the Sunderland Gas Company have invited the members and associates to visit the Hendon Gas-Works, and afterwards lunch with them.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—In reference to the discussion (published in last week's issue) on Mr. Veevers's paper read at the recent meeting of this Institution, we have received a letter from Mr. W. A. Walker, of the Elland Gas-Works, in which he says that he intended making a few remarks, but had unfortunately left his note-book at home. He has at his works two scrubbers filled with boards; pumping ammoniacal liquor through one, and using clean water in the other. The quantity of coal used in 1879 was 4175 tons, and the quantity of liquor obtained was 756 tons, or 39¾ gallons per ton of coal carbonized. The cost of purification, including lime and labour, has been reduced from 0·71d. to 0·54d. per 1000 cubic feet since the introduction of the scrubbers. He has had a gallon of 5° Twad. liquor analyzed, and it was found to contain 1·947 per cent. of NH_3; 0·474 per cent. of SH_2; and 1·425 per cent. of CO_2. The scrubbers give no pressure and require no power, except the pumping of the liquor through the first scrubber. No trace of ammonia whatever is left in the gas.

WAVERLEY ASSOCIATION OF GAS MANAGERS.—The half-yearly meeting of this Association was held at Berwick-on-Tweed on Wednesday, the 8th inst. The chair was occupied by Mr. Hall, Manager of the Berwick and Tweedmouth Gas-Works, and there was a good attendance. The members first visited the gas-works at Spittal, and congratulated Mr. Hall on the improvements he had made. When on their way to Berwick to hold their meeting, the members were kindly entertained by Mr. Alexander Robertson, of the Tweed Iron-Works, at his house. They then proceeded to the King's Arms Hotel, where the meeting was held. The Treasurer submitted a statement of the funds of the Association, showing that they were in a satisfactory condition. The Chairman, in his address, gave his opinion on the different appliances used in the manufacture of gas, and their merits were freely discussed. At the close of the business the members of the Association, joined by a few friends, dined together, and the rest of the day was passed in social intercourse and enjoyment. The meetings of the Association next year are fixed for the second Thursdays in April and September, at Melrose.

THE FORTHCOMING EXHIBITION OF GAS APPARATUS AT GLASGOW.

[From the *Glasgow Herald*.]

Under the auspices of the Philosophical Society of Glasgow, there is about to be held an exhibition such as has never previously been held in Scotland, and such, indeed, as has never been equalled in the United Kingdom, if we consider its extent and variety, and the great degree of scientific interest attaching to the collections of exhibits in several of the departments. Briefly it may be called a Gas Apparatus Exhibition, but it is to be that and a good deal more.

Starting with a guarantee-fund of upwards of £1100, the accumulated result of the proceeds of a Fine Art and Industrial Exhibition held by the same Society in the winter of 1846-47, the promoters of this exhibition resolved to do something towards advancing several departments of applied science, by giving inventors, manufacturers, and other persons an opportunity of showing what could be done in improving the materials and methods of artificial lighting and heating, and the apparatus connected with the same, recourse being had to coal gas, electricity, mineral oils, and the gases obtained from them, candles, &c. They also thought that the conduction of sound by electricity, the use of gas and water for producing motive power under a variety of circumstances, the apparatus connected with the safe working and lighting of mines whose atmosphere is more or less charged with inflammable or explosives gases, and various other allied subjects, should fall within the scope of the exhibition. Very early in the progress of the movement a large and influential Executive Committee was constituted, and during the last three months an extraordinary amount of work has been overtaken by them; and the result is that there will probably be well-nigh, if not even quite, 150 different firms, companies, and individuals entering and accepted as exhibitors. The exhibition, which is to be held in the Burnbank Drill Hall and grounds, Great Western Road, is to be opened on Tuesday, the 28th inst., and is to be continued for a period of four weeks. Latterly the arrangements and prospects of the undertaking have assumed a very definite shape, and are such as to warrant us in noticing some of the more interesting matters connected therewith. There will be given in connection with the exhibition no fewer than five evening lectures by men eminent in their respective departments. One of the subjects will be "Gas Lighting in the Household;" another, "Heating by Gas." One of the lecturers will discourse on "Lighthouse Illumination," and there will be lectures on "The Coal Tar Colours," and on "Conduction of Sound by Electricity." At least two of the lecturers are the leading authorities in Britain on the subjects on which they will treat.

Visitors to the Burnbank Drill Hall will find laid out for their inspection and study a large and varied display of apparatus to illustrate the manufacture, distribution, measurement, and use of coal gas—beginning with the retorts, and ending with the burners. In every case there will be objects of very great practical and scientific interest exhibited, more especially in respect of meters, wet and dry, from eminent makers in Edinburgh, Glasgow, and London; burners, including Sugg's, Bray's, and some most wonderful things from Dublin, the invention of Mr. Wigham, and likely to be of great advantage for lighthouse illumination; and in respect also of gas motors, of which at least three different types will be shown in action doing useful work. It is also just possible that a Glasgow inventor—a clever mechanic and chemist—may also be able to show what this city can do in the same direction. One of the types just referred to is, we believe, quite a new invention, combining various improvements that have suggested themselves during the last few years. In the department of heating and cooking by gas there will be a large and interesting display from the leading makers, as well as from recent inventors, and not the least important thing amongst the stoves will be that of Dr. Adams, of this city, which will on this occasion be publicly shown for the first time. This invention may be regarded as one of the most novel exhibits, as it is certainly one which has excited a large amount of interest amongst gas managers, gas-stove manufacturers, inventors, and scientific men, and other persons throughout the kingdom, the general belief being that it is practically and scientifically the most important invention yet made in connection with appliances for utilizing coal gas as a heating agent. We understand that Dr. Adams intends to have ready for exhibition no fewer than three forms of his stoves, one of which will illustrate the application of his invention to cooking purposes. The secondary products of the coal gas manufacture will occupy a leading place in the exhibition, more especially those obtained from the tar well by chemists during recent years. There will be a large collection from the works of the West of Scotland Chemical Company (Messrs. Archibald Arrol and Sons), Dawsholm, Maryhill; and in the department of coal-tar dyes, two splendid collections are to be sent from London, through the special efforts of Messrs. Henderson, Hogg, and Co., of this city—the exhibitors being Messrs. Burt, Boulton, and Haywood, and Messrs. Brooke, Simpson, and Spiller, both of them firms of the greatest eminence in this field of scientific industry. Other two important and extensive collections of those dye-stuffs—embracing both the aniline and anthracene series—are coming from two eminent firms in Germany, the intermediary in this instance being Mr. J. A. Dixon, who, besides being legal adviser of the firm in this country, is quite at home in the literature and science of such chemical products. In the collection from one of these establishments there will be one of the latest triumphs of the chemical art in its synthetic province—namely, artificial indigo. But both collections are of such interest that they will doubtless command a great degree of attention both from scientific chemists and from practical dyers, calico printers, &c.

Electric lighting will be a prominent feature of the exhibition, applications for space having been made on behalf of several firms, whose dynamo-electric machines and lamps may not unlikely be submitted to a series of competitive tests of an exhaustive character by a committee of jurors, who may be regarded as experts in such matters. The leading exhibitor in this section will be Mr. R. E. Crompton, of London, whose scientific skill has already been well demonstrated by the lamp of his invention which is in operation at St. Enoch Station, certainly one of the best electric lamps yet brought into use. It is whispered, however, that before the exhibition closes there will be brought forward a lamp that is calculated to outstrip everything of the sort yet before the public. It is the invention of Mr. J. H. Gordon, the Assistant Secretary of the British Association, and is spoken of by leading authorities in matters electrical as a great scientific triumph. We may mention that it is proposed to put the electric light and gas light against each other in the Drill Hall. At the suggestion of Mr. J. L. Bruce, one of the members of the Executive Committee, and to whom in a great measure has been committed the subject of hall arrangements, ventilation, &c., it is proposed to have the exhibition constantly under artificial light, one bay or span being given up to each of the two parties of exhibitors, those dealing in gas light and those who pin their reputation to the new light. It is intended also to have some of the "great lights," both gas and electric, shown in the grounds in front of the Drill Hall. Messrs. Thornton, to whom the refreshment department has been entrusted, will extensively illustrate the use of such an exhibition by

cooking with gas. They may also give some practical demonstrations of a public or semi-public character.

In another department water-meters and water-motors will form an interesting series of exhibits, the latter being all shown in action. Some of the engines will be engaged in providing for the thorough ventilation of the Drill Hall—a matter which has given much anxiety to Mr. Bruce and his fellow-members of Committee.

Amongst the miscellaneous apparatus there will be shown a gas-lighted buoy (Pintsch's) such as is now used at Roseneath Patch, and as is henceforth to be used at Skelmorlie Bank and Garvel Point. The buoy will be charged with gas to maintain it in action constantly during the whole of the four weeks that the exhibition is to be open. There will be some interesting and valuable apparatus connected with lighthouse illumination, more especially that sent by Messrs. Chance Bros. and Co., Birmingham; and there will likewise be an extensive collection of miners safety lamps—a "Geordie" of 1816, and a "Davy" of 1820—together with fire-damp indicators, ancient lamps from Jerusalem, &c., and the exhibition will doubtless be somewhat memorable from the way in which the gas coals of Scotland are to be illustrated.

Altogether the exhibition promises to be exceedingly important, interesting, and deserving of success.

ON A SYSTEM OF HOT CONDENSATION.

By Mons. F. Cadel.

A Paper read at the Meeting of the Société Technique de l'Industrie du Gaz en France, held in Paris, June 22 to 24, 1880.

[Translated from the *Journal des Usines à Gaz.*]

Gentlemen,—Your attention has for some time past been very properly called to a system of condensation, having for its object to increase the illuminating power of gas, by keeping in it the light hydrocarbons which are usually absorbed by the tar. The principles of the system were set forth two years ago in a paper read before a meeting of gas managers in Scotland, and published in the Journal of Gas Lighting. (See Vol. XXXI., p. 802.) I was the more struck with the system, because, without being aware of the fact, I had in part brought its principles into practical application; and besides this, in view of the possible competition of the electric light, with which we are occasionally threatened, it appeared to me that a process so simple, and so economical, for increasing the illuminating power of gas would be one of the best weapons of defence for our industry, and therefore I resolved without any delay to make it as complete as possible.

I will begin by defining its theory, which, it seems to me, has not always been sufficiently elucidated. It rests entirely upon the fact, that when the tar is brought into contact with the gas, it absorbs the light hydrocarbons which the gas contains, and, as a result, very materially affects its illuminating power, but that this pernicious influence diminishes when the heat increases, and disappears altogether when the temperature of the hydrocarbons has been raised to boiling point.

I was therefore led to the following conclusions:—

1. It is necessary as far as possible to avoid the contact of the gas and the condensed tar, so that the one may not be subjected to the injurious action of the other. Experience has proved to me that this is the essential part of the method, and the principle that should serve as a rule for condensation, especially at the commencement.

2. Where contact of the gas with the tar cannot be avoided, as upon the interior surfaces of the pipes, it should take place at the highest possible temperature; at least it certainly ought not to take place at a low one, and therefore the pipes should be protected from the exterior atmospheric influences.

Lastly, the largest possible portion of the tar should be condensed in a heated state—that is to say, while its contact with the gas is the least injurious; and it is clear that, as a result, the gas will have so much the less to fear from the tar, inasmuch as it will carry forward with it a smaller quantity.

To effect this, the gas must be kept for a certain length of time at a high temperature in appliances sheltered from the action of the exterior temperature, or even, if possible, artificially heated. In order, however, to dispel, if possible, an error to which too much credit has hitherto been attached, I would call your attention to the fact that here the object is not to keep the gas and the tar together, seeing that, as regards illuminating power, one has nothing to gain by being with the other, whatever may be the temperature, and this I hope to demonstrate presently by some conclusive observations. The object is simply to obtain at a high temperature the separation of the heavy tars, which, as we shall presently see, are most injurious to the illuminating power of the gas. When there remains only the light tar in the gas, we shall no longer have to take so many precautions.

In applying the foregoing principles, I first of all endeavoured to prevent the contact of the gas and the tar in the hydraulic main. I was at that time using pipes of 57 centimètres (22½ inches) in diameter, one to every three ovens, and from these pipes the liquid flowed away by the upper level. For these pipes I substituted others of 80 centimètres (31½ inches) in diameter, with the view, if possible, of effecting a diminution of the seal; and to bring about the separation of the gas and the tar, I caused the condensed products to flow away by the compartment opposed to the gas. As there was no condensation of water in the hydraulics, but, on the contrary, that with which they had been filled at the outset gradually evaporated, I caused more to be added at regular intervals.

Under these conditions, I noticed during the past winter considerable differences in the illuminating power of the gas when it bubbles through tar or water. In the former case a standard of from 98 to 100 litres (3·4 to 3·5 cubic feet) was with difficulty obtained; in the latter, I made gas of 85 litres (2·97 cubic feet) on the average, and one day we came down as low as 80 litres (2·8 cubic feet). This experience has been repeated on several occasions in the most conclusive manner. It must be stated, however, that we were then in the midst of very cold weather, and had a separate hydraulic main for each bench. The result was that, owing to the large exterior surface, there was a considerable cooling of the liquid, the temperature of which fell below 6° C. towards the end of the distillation. The same kind of experiments made in warmer weather gave much less marked differences in the standard.

It is certain that the benefit resulting from the separation of the gas and the tar in the hydraulic main will vary considerably according to any circumstances which may cause a variation of the temperature of the tar in the main, and also perhaps with the method adopted of conducting away the liquid; for if this is effected at the lower part of the main, the tar in which the gas bubbles is constantly being renewed, while if the liquid flows away at the upper part the gas always bubbles in approximately the same tar, which, by becoming saturated with hydrocarbons, should not have any effect on the illuminating power of the gas. The temperature of the liquid in the hydraulic main will, as a general rule, exceed 80° C. if the main is of small diameter, and has to serve for several benches, when the latter are suitably heated and are working in the proper manner; but if one portion of the settings in connection with a hydraulic is out of action, or if the retorts are badly heated, great risk is run of the tar being of a sufficiently low temperature to materially affect the quality of the gas, so much the more so in proportion as the outside temperature is lower and the hydraulic farther removed from them. This alteration in the quality of the gas will often be very slight and difficult of appreciation, inasmuch as different circumstances may cause a variation in the illuminating power; it will nevertheless be quite perceptible in most cases, even when the temperature approaches 80° C. This will be apparent from the following experiment:—Having placed some hot heavy oil in a meter, I found at a temperature of 77° C. a loss of about one-third of the illuminating power when the gas was compared with a similar size bat's-wing burner receiving its supply from a wet meter. The loss was 44 per cent. at 70°, 56 per cent. at 50°, 66 per cent. at 44°, 75 per cent. at 32°, and 87 per cent. at 18° C. It will thus be seen how energetic is the action of the heavy oil upon the gas, and how rapidly it increases when the temperature falls.

As a consequence of what has been stated above, I have no hesitation in thinking that it is desirable to adopt generally the system of causing the gas to bubble in water, in order to definitively protect it from one of the very variable causes, and one which may become serious, of alteration in the illuminating power of the gas. The employment of water appears to me to be absolutely necessary if it is desired to use a large-sized hydraulic main, and especially where one main is used for each bench; although, instead of adding fresh water from time to time, it would evidently be better to introduce a small stream of water, which is the plan I am about to adopt, and I hope by so doing to facilitate the flow of the tars that are viscous, and flow with difficulty even through pipes of 20 centimètres (8 inches) diameter. If the gas cannot be allowed to bubble in water, it is evident that hydraulic mains of smaller size, and made flat at the bottom—those which retain in them the least possible quantity of liquid, which should flow off at the upper part—should be used; also those well protected from the effect of cooling from without, and which are not connected with more ovens than those which are generally in use at one time. All these arrangements have for their object the maintenance of the temperature of the tar as high as possible, and the reduction to the minimum of its contact with the gas.

[The author of the paper then gave a somewhat lengthy description of a special form of hydraulic main, which he considered to possess advantages over that generally employed.]

Some time since I placed on each of our three settings of 12 retorts, between the two lines of hydraulic mains, a collecting pipe, 80 centimètres (32 inches) in diameter, which I called the artificial hydraulic, and which received the gas from either side by three transverse pipes, 30 centimètres (12 inches) in diameter. Between the artificial hydraulic and the pipe condenser I had about 500 feet of piping, 60 and then 50 centimètres (24 and 20 inches) in diameter, upon the length of which there were placed some coolers with running water, and the exhausters. These coolers were formed by two vertical plates of metal separating alternate layers of water and gas. By thus offering large passages to the gas, and by mixing in a heated state the production of the different ovens, I hoped to effect an improvement, without being altogether clear as to how it was to be brought about, and I tried to effect a diminution in the deposits of naphthaline rather than to obtain an increase in the illuminating power of the gas. I fancy I obtained an increased yield, although I am unable to say to what extent; the results likewise appeared to be equally successful as far as the naphthaline was concerned, as the deposits of this substance became more and more rare, and occurred at points still farther removed from the works. But more especially I obtained a considerable improvement in the illuminating power of the gas.

In the month of August, 1877, with 12 retorts producing altogether 14,000 cubic mètres (500,000 cubic feet) of gas per 24 hours, we had an average standard of 92·85 litres (3·25 cubic feet) at a barometric pressure of 710 millimètres (28·5 inches), and with the temperature at 23° C. Reduced to a pressure of 76 millimètres (3 inches) and a temperature of 15·5° C., it made a standard of 85·25 litres (3 cubic feet). Our original hydraulic mains of 57 centimètres (23 inches) diameter were still in use, and all the ovens connected with them were at work; the liquid there was consequently very hot. The artificial hydraulic was also working at its maximum; the gas leaving it at a temperature of about 80° C. The water in the coolers stood at between 30° C. and 40° C., and brought down the gas to only 55° C.; on its entrance into the pipe condenser it was at 40° C., and on its exit therefrom it was at from 20° C. to 25° C., which was very nearly the outside temperature. Thus the principles of the system we are now considering were in a great measure realized.

In the following months, using the same coal and raw material generally, the illuminating power decreased. In September it was 90 litres (3·15 cubic feet); in October, 94 litres (3·3 cubic feet); in November, 92·50 litres (3·23 cubic feet); in December, 91·50 litres (3·2 cubic feet); and in January, 92·80 litres (3·25 cubic feet). Having since then employed coals of various qualities, the standards have ceased to be comparable. There cannot be any doubt that the differences I have just mentioned were due to the effect of the outer temperature.

In order to complete the application of the new principles to our condensation, and also to protect the gas from atmospheric influences, I decided at the beginning of the year 1878 to increase to 1·75 mètres (5 ft. 9 in.) the diameter of one of the artificial hydraulic mains, and I protected each from the action of cold by means of a casing, which I also applied to the pipes conducting the gas into it. It was at this period that I fitted up my special hydraulics, and in order to turn to account the old hydraulics, I fixed them after the new 5 ft. 9 in. hydraulic along the walls and in the interior of the retort-house. Finally, in order to separate as soon as possible the gas and the condensed tars, I arranged to have them conducted away by means of special piping, branching off at several points from the gas-pipes.

Under conditions such as these, and with the same kind of coal, we obtained during the past winter, with a temperature ranging from 12° C. to 17° C., an average standard of 85·30 litres (2·98 cubic feet) with 24 ovens, one-half of which were upon the 5 ft. 8 in. artificial hydraulic, and the other half upon the smaller one. There was an improvement of more than 0·2 of a cubic foot of gas over the quantity obtained in December, 1877, but it was the same standard as we had in August, 1878.

In the succeeding months we were compelled to let down the retorts connected with the large hydraulic. The result was a diminution in the illuminating power of the gas, as was the case in the autumn of 1877, but to a much less degree. Thus in April the average was 87·50 litres (3 cubic feet) instead of 94 litres (3·29 cubic feet) obtained in October, 1877. Quite recently, with 12 retorts on the small hydraulics, as in August, 1877, but with a much lower outside temperature, we again reached the standard of 85·30 litres. All these figures are taken from the official testings of the gas, which are made every evening.

Therefore, although my new arrangements worked very incompletely, they regulated the illuminating power of the gas very well; but the action of the outside temperature always shows itself, and we notice that the standard is decidedly better in summer and in winter than in the intermediate seasons. These variations are explicable only by the influence of the tar deposited on the inner surfaces of the pipes. The temperature of

this tar is affected by atmospheric influences through the thin sides of the pipes, and its action upon the gas varies with its temperature. In summer this action is diminished by the elevation of the outer temperature; and in winter it has an effect relatively much less, consequent upon the large quantity of gas passing through the pipes.

I was confirmed in this hypothesis by a series of observations in which I found that the standard of the gas varied very perceptibly, not with the temperature of the gas itself in the pipes, but with the outer temperature, with the atmospheric influences of wind, rain, or sun; that is to say, with the temperature of the sides of the pipes, and, consequently, with the tar deposited thereon.

Thus, having one day made some gas of 85 or 86 litres standard (3 or 3·2 cubic feet), at a temperature of 18° C. to 20° C., and in calm weather, it happened that on the following morning we obtained a standard of only 90 to 92 litres (3·16 to 3·23 cubic feet) with an outside temperature of 10° C. to 12° C., and a strong north wind blowing. With regard to the temperature of the gas in the artificial hydraulic main, and over three-fourths of its length, it had remained about the same. I increased it by means of a jet of steam in the artificial hydraulic, but without improving the standard. These observations were made at several successive intervals. It was also noticed very frequently that the standard went up suddenly upon an unexpected increase of temperature taking place. This is at once the consequence and the proof of the influence of the condensed tars, which, becoming, by means of the cold, enriched with illuminating hydrocarbons, probably restore them to the gas under the influence of heat. The following are some further observations in support of this theory. Having caused the gas to pass from the small hydraulic into the larger one connected with the furnaces not in use, I found on the first day a very notable diminution in the standard of the gas, which fell to 93·50 litres (3·27 cubic feet), notwithstanding that I had two jets of steam which kept the gas at a temperature of 80° C. Here the action of the tar deposited against the sides of the larger artificial hydraulic is clearly seen. These sides took a long time to become hot, in consequence of the thickness of their coating, notwithstanding the high temperature of the gas. The condensed tars first of all cooled very considerably, and this seriously deteriorated the quality of the gas. This action diminished as the sides of the pipes became hot, and, in fact, the standard the next day was 2 litres (0·07 cubic foot) better, and it improved still further the days following. On the other hand, we obtained an important increase of illuminating power simply by covering up a length of 40 mètres (48 yards) of pipe placed between the two artificial mains.

Lastly, in causing the gas to pass from the outlet of the artificial hydraulic, at one time into a water cooler having a superficial area of 120 mètres (130 yards), at another into a pipe condenser, we have noticed in the latter case a diminution of illuminating power of about 1½ litres (0·05 cubic feet), which could not be the result of anything else than the tars deposited against the cooling surface, which was so much more extensive in the pipe condenser.

In the course of these experiments I have been able to convince myself of another very interesting fact—namely, that the heavy tars (those which are first deposited, and do not contain any benzol), are by far the most injurious to the illuminating power of the gas, and that, on the other hand, the tar has the least injurious effect upon the gas the lighter it is, the more it is charged with light essences, and the longer it remains undeposited.

Thus I did not find any very appreciable difference in the illuminating power of the gas by not using, even in cold weather, a pipe condenser of 700 mètres (765 yards) extent, placed after the exhauster, and receiving gas cooled down to 35° C. or 40° C.; and you have had an example of the pernicious action exercised by tar upon apparatus containing hot gas.

For the rest, it is easy to verify the differences in the action of the heavy and the light tars, by putting into a meter some tars of different densities, and comparing the gas from a bat's-wing burner supplied by this meter with that from a similar burner, of the same consumption, supplied by a wet meter. Thus, while at the temperature of 18° C. the heavy oil takes away 87 per cent. of the illuminating power, I have observed that the tar collected between the exhauster and the pipe condenser destroys only one-fourth of it, and that coming from the condenser only one-tenth. If the meter is caused to work for a certain time with heavy oil, it is observed that the liquid increases day by day, thus clearly proving that the illuminating power is essentially dependent upon certain condensable essences, and at the same time that the standard increases little by little in proportion as the oil becomes charged with hydrocarbons. All this leads me to ask, in passing, if it does not seem possible to employ in gas-meters a mixture of heavy oil and benzol, in the condition when it is without influence upon the illuminating power of the gas. This mixture would have the advantage of not being liable to congeal or evaporate, and moreover would not have any injurious effect upon the meters. The employment of such a liquid, if it became practicable, would be one of the most important steps in the progress of our industry.

I was desirous of finding out the influence upon the volume of the gas of the apparatus for condensing by heat, by causing the gas to pass from different sides. I ascertained that this influence was favourable, though I could not arrive at very definite results.

We have already seen that the gas, in passing into a pipe condenser on leaving the artificial hydraulic was not of so good a quality as when it passed into the water condensers, although the cubical contents of the former were more considerable. The beneficial influence of the increased volume was nullified by that of the tar deposited upon the sides. When the gas was caused to pass for several days in succession into the two artificial hydraulics, the standard reached an average of 84 litres (3 cubic feet), which is simply 1½ litres less than when other gas was caused to pass directly into the water condensers, although the volume was incomparably greater. Here, again, the influence of surface counterbalanced in a great measure that of volume. It is, however, as I remarked just now, an important improvement, and I believe that, if the larger artificial hydraulic were heated from the outside, this improvement would be much more considerable.

The theoretical statements I made at the commencement of my paper have, therefore, been entirely verified by experience, and we are in a position to draw from them with certainty the following practical conclusions:—

As a general rule, it is requisite for hot gas condensing to have apparatus of large volume and of as restricted surface as possible; and it is especially essential that this surface should be enveloped in a covering which would thoroughly protect it from atmospheric influences. It would be still better if it could be heated from without, as can be done with the artificial hydraulic on the entire block of ovens, by building it into the brickwork, as it is not sufficient to simply place it thereupon. An artificial hydraulic of 2 mètres (6 ft. 6 in.) in diameter appears to be of suitable dimensions for two retorts set back to back.

The shape of the apparatus, too, is a matter of much importance. The inner surfaces should be so arranged that the least possible quantity of tar should be liable to attach itself to them. The round shape appears to be a decidedly bad one, for the reason that the lower half alone receives the tarry deposits, which glide slowly to the bottom of the pipe, and are thus brought into prolonged and repeated contact with the gas. A flat-bottomed pipe seems to be preferable, since the surface receiving the tar is reduced to a minimum. The best pipe for hot gas would, I believe, be one with a flat bottom, and having this bottom covered with a layer of water which would conceal the tar, and protect the gas from its action. And further it is evident that a round pipe would be the more defective the smaller its diameter was.

A gasholder placed in a closed building, which could be heated if necessary, would be an excellent, if not perhaps the very best condenser for hot gas. The water, which could be renewed and cooled, would act as a refrigerator, by interposing itself between the gas and the condensed tar. Placed before the exhauster, the gasholder would at the same time act as a regulator, and, in case of need, its reserve of gas could also be utilized.

Washers, of whatever kind, are good things, as the water used therein protects the gas from the action of the tar. And here I will mention a fact related to me by one of our colleagues. The gas made at a small works was, on one occasion, allowed to pass directly from the retorts into the holder, the result being a very considerable increase in illuminating power.

Vertical condensers, although having but little injurious effect upon gas that has been already cooled and deprived of its heavy tars, are evidently of no use for hot gases. A cluster of horizontal pipes of sheet iron would be of still less value. The horizontal position of the pipes is evidently the most unsuitable, as far as the contact of the gas with the tar is concerned. On the other hand, I have been able to convince myself that water condensers with vertical iron plates, in which the water is never very cold, give good results as regards illuminating power. Their surface is, in fact, very small relatively to their power; and regard being had to the upright position of the sides, there should be only a very small quantity of tar in contact with the gas. Moreover, this tar does not run any risk of being cooled by the outside temperature, which is exactly what theory demands. This, however, cannot be said of a pipe condenser having a spray of water. The spray increases the power of the apparatus, but at the same time adds to its inconveniences.

It is quite unnecessary to say that a coke column, without a water spray, acting upon hot gas would be a very defective apparatus; and the same remark applies to every condenser constructed upon the principle of impingement or scrubbing. Appliances of this kind are evidently bad in principle, in consequence of the intimate contact which they set up between the tar and the gas. Nevertheless they may be tolerably harmless upon cold gas, and gas that has been well cleared of its heavy tars.

If cooled tar has so detrimental an influence upon the gas, it was only natural to suppose that a very great advantage would be gained by keeping the whole of the tar at a high temperature by means of a mechanical condenser; and this I endeavoured to do by setting up one of Pelouze and Audouin's apparatus at the outlet of the artificial hydraulic. On the contrary, I obtained on four separate occasions a notable diminution in the standard, the temperature of the gas in the condenser being from 75° C. to 80° C. This proves that at that degree of heat the tar still alters the character of the gas, and this is also the result of the experiment I have already referred to in connection with the hydraulic, where some oil at 77° C. deprived the gas of one-third of its illuminating power. Besides, the apparatus works very badly with so large a quantity of tar to condense. A difference of 15 centimètres (6 inches) in pressure was required in order to pass 14,000 cubic mètres (500,000 cubic feet) of gas in 24 hours through a condenser constructed to pass 30,000 (1 million cubic feet), but I was satisfied that it took out very nearly the whole of the tar.

It would be advisable to repeat the same experiment at a higher temperature; and for this it would be necessary to superheat the artificial hydraulic, though I doubt whether any good results would be obtained. One might succeed in avoiding the deterioration of the gas by tar, but not in enriching it. The non-success of our attempt proves clearly that the gas does not derive any benefit from the tar, at least in a way that will be permanent.

I stated at the commencement of this paper that the system of condensation with which I was occupied had for its object likewise the prevention of naphthaline deposits; and it is quite clear that the more the hydrocarbons are kept in the gas, the greater will be its power to dissolve naphthaline, and consequently so much the less of this substance will be deposited in the mains. But there is something more than this, and the system I now introduce goes so far as to get rid entirely of naphthaline obstructions. This is a statement which has not yet been quite absolutely proved; but after what has been experienced with naphthaline at the gas-works at St. Etienne, we may reasonably come to the foregoing conclusion.

Twenty years ago this was a matter that did not occupy much attention; but a few years later the temperature of the retorts having been increased and the consumption of gas considerably developed, without the plant having been very much enlarged, the condensation broke down. The bends in the washers and purifiers, and especially those in the gasholders, were choked with naphthaline, though at the same time there was no trace of it in the town mains. For some considerable time I was enlarging our cooling and purifying apparatus, without touching the neighbouring pipes from the ovens. Naphthaline disappeared from the works; but then it deposited itself in the town mains, at first in large, afterwards in smaller quantities, and then in gradually lighter deposits, which were found at greater distances in proportion as the gas had been better condensed at the works. However, there was always some of this impurity present in sufficient quantity to cause annoyance and trouble. When I fitted up the 32-inch artificial hydraulics, with the 20-inch pipes following them, the naphthaline deposits diminished considerably, though they did not disappear entirely. Since I completed the application of the new system of condensation, we do not hear anything of this. In the spring of the present year some traces of naphthaline were pointed out to me; but the larger hydraulic has not been in operation for the past few months.

It is somewhat difficult for me to argue the question theoretically, as I am unacquainted by experience with any facts in connection with the subject of the presence of naphthaline in the free state in gas. I tried to pass a small part of the gas produced in one of the retorts into a flask plunged in a refrigerating bath. Between the fourth and fifth hours I obtained some crystals of naphthaline in the flask, but in too small quantities to allow me to present this experiment to you as conclusive. Nevertheless, knowing that naphthaline is produced by the decomposition of the tars at high temperature, it may very reasonably be supposed that it is during the final hours of distillation that it is found in the free state in the gas. It is likewise produced in the first hours, but it is then absorbed by the tarry vapours which are present in considerable quantity; while in the latter hours, as the gas no longer contains any tar, the naphthaline vapours remain in it in a free state. It is clear, therefore, that in order to relieve ourselves of these vapours, we have only to put them in contact with tar. This has already been attempted; but in order that this contact may be effected without detriment to the illuminating power of the gas, it must take place at a high temperature, which will facilitate the dissolution of the naphthaline. The simplest plan is evidently to mix in a hot state some of the gases from contiguous retorts, charging the latter at different hours; this is what takes place in the artificial

hydraulic. The naphthaline vapours produced in the last hours of the distillation going on in one retort are absorbed by the tarry vapours being given off in abundance during the first hours of the charges in the neighbouring retorts, and afterwards condensed with the other vapours. Unless this previous absorption takes place—the result of a prolonged and intimate contact in a heated state—it is very difficult, and even impossible, to effect in all seasons the entire condensation of the free naphthaline vapours. I recollect having tried unsuccessfully a large chamber into which I had foolishly introduced gas partially cooled. If these vapours come in contact with naphthaline already accumulated, they become fixed therein. This is what happened when, in consequence of insufficient cooling, we had deposits of naphthaline at the works, and not in the town mains. When, however, we had by a more vigorous cooling, got rid of the naphthaline deposits at the works, those vapours which had escaped condensation passed on, and were deposited in the town mains, until they were absorbed by the tarry vapours in the artificial hydraulics.

I asked myself why deposits of naphthaline did not occur in summer and in winter. This appears to me to be the reason: These deposits first of all certainly form in summer, on very hot days, consequent on insufficient condensation at the works; but the amount of gas sent out being small, they do not cause annoyance, and no notice is taken of them. In winter they do not form, because the condensation is rendered sufficiently powerful by the exterior temperature. The naphthaline vapours finding in the town mains conditions of temperature higher than those they encountered at the works, it is natural that no deposition should occur therein; it is even certain that the gas takes up from the mains in winter the naphthaline it has deposited there in the summer. Doubtless proof of the presence of naphthaline might be found by always submitting the gas at the works to the minimum temperature it would encounter in the town; but this is a matter very difficult, if not impossible, to realize at all seasons, while it is always certain that the naphthaline vapours from one retort will be absorbed by the tarry vapours from a neighbouring one. We may, however, if needful for greater safety, combine the two systems, and I believe that in this way we shall for ever cease to be troubled with naphthaline. This I did by fitting up before the gasholders a refrigerator with flowing water, which, at all seasons, is of the same temperature as the soil, the water being supplied from the water-pipes in the town.

We cannot speak of naphthaline without remembering the remarkable and interesting paper presented to us two years ago by M. Brémond.* He proposed to prevent naphthaline deposits by drying the gas. The presence of aqueous vapour appears, in fact, necessary to induce the sublimation of naphthaline; but it should be remembered that the permanent desiccation of gas is impossible of realization in practice.

It occurred to me that it would be interesting to ascertain the relative quantities of tar deposited in the several parts of the apparatus. This inquiry is very directly connected with the question which now occupies our attention.

The hydraulics kept back from 40 to 45 per cent. of the total production. The two artificial hydraulics, following one after the other, kept back first of all one-third of the total quantity, which may be called the heavy tar, or that condensed when hot; and here there is a remarkable fact apparent—viz., that a vertical condenser of 290 mètres (317 yards) capacity which came afterwards, did not for two days give signs of any product of condensation, thus seeming to show a very marked distinction between the heavy and the light tars. Later on the same quantity of tar was distributed over the artificial hydraulics and the pipe condenser. Finally, the tar deposited in the successive appliances, and which I shall call tar condensed by cold, or light tar, forms rather more than one-fourth of the total production.

I had distilled separately the three qualities of tar, and the following is a *résumé* of the results obtained:—

In the tar from the hydraulics there was 0·65 per cent. of light oil containing much phenic acid, naphthaline, and a little oil, distilling at from 180° C. to 210° C.; 8·50 per cent. of heavy liquid oil without naphthaline; and 89 per cent. of pitch.

In the heavy tar I found 0·77 per cent. of light oil without benzol; 22·50 per cent. of heavy liquid oil; 7·50 per cent. of naphthaline; and 67 per cent of pitch.

In the light tars I found 12·37 per cent. of light oil rich in benzol; 9·65 per cent. of heavy liquid oil; and 18·40 per cent. of naphthaline.

I likewise had analyzed the tar from the Pelouze and Audouin condenser placed after the hydraulic. It contained only 0·75 per cent. of light oil without benzol; 5·30 per cent. of heavy liquid oil; and 8·30 per cent. of naphthaline. The tar, in this rapid precipitation at a high temperature, therefore loses nearly all the light products it contains, without the gas profiting in the least by it. These products are subsequently condensed at a distance; but are we sure of recovering them?

On the other hand, it will be seen that the Pelouze and Audouin condenser is far from retaining all the naphthaline ordinarily contained in the tar in its bulk. A certain portion escapes, and it is doubtful whether it is afterwards entirely condensed in the subsequent apparatus, without the aid of an easily condensable vehicle to carry it along with it, and thus we should run considerable risk of choking up our mains.

GOOLE GAS AND WATER SUPPLY.

It may be remembered that in the JOURNAL for the 24th ult. (p. 305), it was stated that an arrangement had been entered into between the Aire and Calder Navigation Company and the Goole Local Board for forming a public company for the supply of Goole with gas and water, and the Clerk (Mr. G. England) was instructed to have an interview with Mr. W. H. Bartholomew, C.E., the Engineer to the Navigation Company, with the object of arranging preliminaries.

On Friday, the 10th inst., a special meeting of the Local Board was held—the Rev. Dr. BELL in the chair—to discuss the result of the interview which had taken place between the Clerk and Mr. Bartholomew, with regard to drawing up a prospectus for the proposed Company.

The CHAIRMAN said he had been requested by Mr. Bartholomew to be present at the interview with the Clerk, and therefore he went. Mr. Bartholomew was a man who had had great experience in these matters, and he recommended that the Board should draw up a draft Bill and submit it to a Parliamentary Agent in London, who would be able to say whether it was likely to be passed in the way they wished. They ought to do this as a preliminary step. Then they could lay it before the Local Government Board for their approval, and if they did not approve of it, of course it would be thrown out, the expense being paid half by the Local Board and half by the Aire and Calder Navigation Company. If it was successful, they could then draw up a prospectus to issue to the public, asking them to take shares in the proposed Company, but it would be folly to do this before they knew that a Company would be formed, or that the Bill would be passed as they wished. Mr. Bartholomew also advised the Board that these preliminary steps should be taken at once, as November, when the requisite notices for the Bill would have to be given, would soon be here. This was the mode of procedure Mr. Bartholomew said was the right one, and to him (the Chairman) it seemed a sensible one, as they could not go to the public before they had the Bill.

Mr. CLEGG asked whether the ratepayers would not have the power of appealing against the Bill if they thought fit. What he meant was that the members of the Local Board need not feel shackled in any proceedings they might take, because the ratepayers would have the power to call a meeting and upset their decisions.

The CLERK said that doubtless the ratepayers opinion would be taken on the matter, which was one upon which a great deal of time might be spent uselessly, as there were only one or two precedents applicable to it. It was not very likely, he thought, that the Local Government Board would sanction the scheme when laid before them without taking the opinion of the ratepayers. Therefore there was not the least cause to call a town's meeting until they positively knew what the requirements of the Local Government Board and Parliament would be.

Mr. COUSE: My opinion is that the Local Government Board will not allow us to forcibly levy a rate for 30 years upon the ratepayers, and invest the money in a limited liability company.

The CLERK said it would not be called a limited liability company. First of all, it was for the Board to consider whether they would take the gas-works at a price which was fair and reasonable, and this was only what Mr. Bartholomew asked; secondly, whether they would take the water-works and sewers. These points decided, the next course was to consult a Parliamentary Agent, and obtain his opinion, and then the opinion of the Local Government Board. The Local Government Board would most probably say it must be a general company. It would not be necessarily a limited liability company, and even if it failed the Board could buy the company out, and the ratepayers would not be losers by it. If the Local Government Board approved of the draft Bill they would say so, and then take the opinion of the ratepayers upon the question. The purchase-money was estimated by Mr. Bartholomew at £34,644. This sum was made up as follows:—The average net profits were, in 1877, £1810 13s. 8d.; in 1878, £1954 0s. 2d.; in 1879, £1932 12s. 10d.—making a total of £5697 6s. 8d., or a yearly average of £1899 2s. 2d. net profit. Taking 17 years purchase at an equivalent to 6¼ per cent., this sum was increased to £32,283. To this was added £2361 the capital expended upon the works in 1879. Mr. Bartholomew in making this calculation had taken the street lamps at the rate of 60s. per lamp, and the dock lamps at 80s. per lamp per annum, instead of 42s. and 60s. respectively. He stated also that he would be willing to pay 60s. for the dock lamps per year.

After a somewhat warm discussion it was agreed that the Clerk, in company with Mr. Bartholomew, should take the necessary steps for carrying out the preliminary arrangements suggested by the latter gentleman, it being explained that the price above mentioned need not necessarily be the price at which the Board must purchase, if they determined so to do; it would probably be much less.

* See JOURNAL, Vol. XXX., p. 491.

ROCKHAMPTON (QUEENSLAND) GAS COMPANY.

The Half-Yearly Meeting of the above-named Company was held on Thursday, June 17—Mr. JOHN FERGUSON in the chair.

The SECRETARY (Mr. H. Mills) read the Directors report, as follows:—

Your Directors have the satisfaction of announcing their recommendation for the payment of a dividend for the half year at the rate of 10 per cent. per annum. After payment of dividend there will remain £176 to be carried from profit and loss to the reserve-fund.

The use of gas-cooking stoves is increasing, and there are numerous inquiries.

The Company have on hand a supply of pipes to lay down 1¼ miles of additional mains whenever the demand enables them to do so profitably.

The works are in highly efficient order, and the purity of the gas is maintained at a high standard.

Two Directors have to be elected at this meeting, in the room of Messrs. John Headrick and J. W. Face, who retire by rotation, but are eligible for re-election, and have given the requisite notice.

Two Auditors have also to be appointed for the ensuing year.

Dr. *Profit and Loss Account, for the Half Year ended May* 31, 1880. Cr.

Manufacture, distribution of gas, and management	£329	18 0	Balance, Nov. 30, 1879	£860	5 2
Discounts on gas-rents	139	2 6	Sales of gas, coke, and tar	2,086	5 6
Wear and tear and depreciation	150	0 0	Scrip and transfers	1	18 0
Bank interest	34	8 5	Rent of dwelling-house	22	10 0
Reserve-fund	198	18 8			
Dividend, Nov. 30, 1879	661	6 6			
Bad debts written off	19	12 9			
Profit this half year	837	11 10			
	£2,970	18 8		£2,970	18 8

Liabilities and Assets.

Capital	£13,226	14 0	Fixed investment	£14,833	16 3
Unclaimed dividend	1	5 0	Floating ditto	346	0 0
Reserve-fund	1,164	12 3	Sundry debtors	722	16 7
A. J. S. Bank	686	19 8	Cash in hand	14	9 11
Profit and loss	837	11 10			
	£15,917	2 9		£15,917	2 9

The CHAIRMAN, in moving the adoption of the report, said the Directors had nothing special to communicate to the Shareholders beyond the fact that the works were in a thoroughly satisfactory condition. The increase in the quantity of gas consumed during the half year, compared with the previous half year, had been 230,000 feet, and the Company had supplied seven cooking-stoves with 160,000 feet of gas. He was of opinion that if the use of gas for cooking-stoves were thoroughly understood, and its advantages properly known to the public, it would be much more extensively employed. Twelve public lamps had been lighted with gas during the half year, but that was a very small number for a town like Rockhampton. In much smaller towns, there were as many as 50 public lamps lighted with gas, and the inhabitants had only had gas in the place for about twelve months. So that in this matter, at all events, Rockhampton was very much behind other places; in fact it was, for its size and importance, the worst lighted town in the colony. They would see, from the report, that the Directors recommended a dividend of 10 per cent., which would be the ninth that the Shareholders would have received, and would make a total of £6300 paid to them since the formation of the Company, or as nearly as possible one-half of the paid-up capital. The Directors had carried over to the reserve-fund a sum of £1340, and written off £1000, while they had only £360 off an overdraft at the bank. Everything had gone on smoothly, and he thought the Shareholders had every reason to be thankful with the present affairs of the Company, as well as with their future prospects. The Directors had not had a single complaint made to them during the last six months from any of their customers, which he thought was a fact that went a long way to prove that they were satisfied. The Company had supplied the highest quality of gas at the lowest possible price, and he supposed that was the reason why the public were satisfied.

Mr. H. JONES seconded the motion, and it was carried unanimously.

The retiring Directors and Auditors were severally re-elected, and a suggestion having been made by a Shareholder that the Chairman, as the head of the Municipal Council, should urge the necessity of increasing the number of public lamps in the town, the proceedings closed.

PROPOSED PURCHASE OF THE BRIDGNORTH GAS-WORKS BY THE TOWN COUNCIL.

At the Meeting of the Bridgnorth Town Council on Thursday, the 9th inst.—the MAYOR (Alderman J. W. M'Michael) in the chair—the question of the gas supply being undertaken by the Corporation came under discussion.

Mr. DOWELL opened the discussion by raising the question as to whether the Corporation should become possessed of gas-works, either by erecting new works, or by purchasing those already existing. He had, he said, thought it possible that the Council might purchase the existing works, and would feel disposed to do so at a reasonable price. The present Gas Company started with a capital of £5000, and soon raised it to £6000; after a time they brought it to £7000, at which it now stood. The Directors admitted that the undertaking had paid 10 per cent., and that the works had been considerably extended, being, it was stated, worth about £18,000 or £20,000. If the Company had increased their works—and he knew they had—it had been done out of the profits left after paying the Shareholders 10 per cent. dividend. If the present Company had paid 10 per cent. and increased the capital by some £8000 or £10,000 in ten or twelve years, why should not the Corporation make that profit? And he should show that if they erected new works in a proper place they could effect a further saving of £150 a year in haulage. The Corporation would be able to light the town free, and also reduce the price of gas to private consumers. He had had it on the best authority that new works capable of supplying 20 million feet of gas per annum, with over 10,000 yards of mains, could be completed for £10,000. But to show that he did not wish to give wrong figures, they might say it would cost £12,000, which at 4 per cent. was equal to £480 a year. The Company's total expenditure was £2100 10s., and, according to his calculations, their total receipts were £3818 4s. Deducting the expenditure from the receipts, they had a balance of £1707 14s. He was reckoning for lighting the town free, and making a reduction of 6d. per 1000 feet to certain consumers, which together came to £775, and this would leave a net balance of £932 14s. in favour of the Corporation, to be applied to any purpose. He was not going into the question of constructing new works, although he thought this would be much better than buying the old ones. If the Council were to purchase the old works it would be much cheaper to pull them down and erect them on a more suitable site. He would propose—"That it is expedient for this Council to adopt such measures as may be necessary for supplying Bridgnorth with gas, either by the erection of new works or the purchase of all or any of the lands, premises, works, and other properties of the present gas proprietors; and that the Clerk be instructed to give notice to terminate any and all existing contracts with the Gas Company."

Mr. MUNDAY, in seconding the motion, said he had long been under the impression that the Council paid too much for lighting the town. He did not object to a company having a good profit, but thought 4s. 6d. per 1000 feet too much to pay for gas. He did not think Bridgnorth so badly situated for obtaining coal as to require them to pay so high a figure.

Alderman WHATMORE said he had considered years ago that the gas-works ought to become the property of the Corporation, and more especially as a profit was to be made out of them. He thought it strange that instead of lowering the price of gas the Company had raised it to 4s. 6d. per 1000 cubic feet. He quoted an instance where a town was dissatisfied with the manner in which it was supplied with gas, and the inhabitants petitioned for powers to compel the Company to sell their works, which was granted. All the profit made went to the Corporation, and a profit of £4000 had been handed over to the Water and Markets Committees to meet a deficit. The present Company had paid 10 per cent., and had increased their works; if they had given the extra profit to the town it would have been a different thing. He did not agree with Mr. Dowell as to erecting new works, and thought the Council should try to buy the present works. He thought it would be fair to offer the Company £150 for every £100 of stock, and £160 would be the maximum they should offer.

On the suggestion of Alderman EDKINS, the words "and that the Clerk be instructed to give notice to terminate any and all existing contracts with the Gas Company" were struck out of the proposition.

Alderman EDKINS supported the motion, and recommended that they should meet the Directors of the Company in a fair spirit, to make the best bargain as between the Shareholders and the town.

Mr. SOUTHWELL said that, being a Shareholder, he had no power to vote, but they would scarcely expect him to remain silent on so important a question. He said Alderman Edkins had spoken with great fairness, but the remarks of Alderman Whatmore were leavened with animosity towards the Gas Company. He (Mr. Southwell) did not complain of Mr. Dowell's statement, and was glad to hear there was so much profit to be made out of the gas supply. He should advise the Council to test the figures very carefully, and if they turned out to be correct, as a large consumer of gas, and in the interests of the town, he should give the scheme his warmest support. Before taking action they should go carefully into the matter.

Mr. DEIGHTON and Alderman PHILLIPS, Directors of the Company, said they should be willing to sell if the Company were met in a fair spirit.

After some further discussion, the motion was put and carried, and a Committee appointed to enter into negotiations with the Gas Company.

THE WATER SUPPLY OF MORPETH.

An Inquiry was recently held at Morpeth, before Mr. J. T. HARRISON, one of the Inspectors of the Local Government Board, respecting an application for a loan of £2640 made by the Morpeth Local Board for the purpose of extending the water-works and improving the supply. Among those who attended were the Mayor (Mr. Davison), the Chairman of the Local Board, Mr. G. Jeffrey (Clerk to the Local Board), and Mr. F. Brumell (Town Clerk).

Mr. JEFFREY stated that the scarcity of water began to be felt about the year 1868 or 1869, and it was then resolved to increase the storeage, and various sums of money had been spent thereon. Nevertheless there had been repeated complaints made to the Board both as to the supply and the quality of the water. In consequence of these and other circumstances the Board resolved to obtain the opinion of a competent person on the matter, and for that purpose they had employed Mr. T. Thompson, who had had considerable experience in works of this kind. He had reported to the Board in October of last year as to an increased supply to the town. In that report he went thoroughly into the matter, and advocated expending £5385 on new works; but only a part of his scheme was adopted by the Board. The Local Board was formed in 1851, and included six townships —namely, Morpeth, 537 acres; Buller's Green, 363 acres; Newminster Abbey, 717 acres; Morpeth Castle, 1491 acres; Tranwell-with-High Church, 1220 acres; and Hepscott, 1594 acres. The total area was 5922 acres, and the total population in 1851 was 4911. Only Morpeth and Buller's Green, however, were rated for special purposes, and the other townships named would not be charged for the contemplated new water-works. In 1871 the population of Morpeth was 4992, and of Buller's Green 297, and their rateable value together was £13,200. There was at present a debt upon the district of £2102, the remains of a sum of £8600 which had been borrowed in 1851 for purposes of sewerage, and for obtaining the present water supply.

Mr. *Middlemas* (Surveyor to the Local Board) gave evidence to the effect that the present water supply was unsatisfactory. The town was, he said, supplied with water from the Tranwell reservoir and from Allery Banks. One-third of the population used the latter, and the remainder the Tranwell water. Both waters had been analyzed, and the analyst certified that the Tranwell water contained too large a quantity of organic matter for drinking purposes, and that it was not good water for domestic purposes. The Allery Banks water was stated to be "quite unfit for drinking, being highly charged with organic matter." Witness had taken out lengths of the main-pipes in two places in the town, and had found both of them encrusted, and containing a great deal of deposit. In dry seasons they had at night to cut off the water from the town, and on one occasion it had to be cut off for some time, between the hours of five p.m. and seven a.m., owing to the deficient supply. There had been 166 new houses built in Morpeth since 1863.

The INSPECTOR remarked that the increase in population having been so small, and the water supply having been sufficient previous to 1868, the present deficiency must be traceable to some cause other than actual consumption by the population.

Mr. *Thompson*, the Engineer, having been examined as to the details of his proposed scheme, in the course of which a geological map was produced showing the strata of the district where the water was proposed to be brought from,

The INSPECTOR pointed out that the water appeared to come from the millstone grit at Edington, which shelved underneath the place where the impounding reservoir stood, and where the Board had a bore-hole. He suggested that they should sink this bore-hole lower through the shale until they reached the second vein of millstone grit, and they might obtain an abundant supply of water which they would not need to filter. He closed the inquiry by recommending that the supply to the town for 24 hours should be gauged, so as to discover whether there was any waste of water; that they should deepen their bore-hole to the second millstone grit, in order to find whether they could by that means obtain a sufficiency of water; and that they should at once gauge the springs from which it was proposed to take the new supplies. He desired the results of these investigations to be forwarded to him.

The MAYOR then presented to the Inspector two resolutions adverse to the present adoption of the proposed new scheme—one of them from the Town Council, and the other from a public meeting held the previous evening.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is, if anything, a slight change for the better noticeable in the coal trade of this district. The better classes of round coal have, since the break in the weather, been moving off more freely, and it is probable that in this description of fuel some advance in prices will be made next month, such a step being already in contemplation amongst the large firms in the Manchester district. In other classes of fuel the market shows no alteration. For gas-making coals there is now little or no inquiry, and there are very few contracts in this district which are yet open. The last important contract concluded was at lower prices than either coal or cannel had ever been bought before, coal especially, which, delivered at the works, I believe averaged about 7s. to 7s. 6d. per ton, being considerably under the figures which have previously been paid. Common round coals for steam and forge purposes still meet with only a moderate demand, and are abundant in the market. Engine fuel maintains its position, owing to the small quantity of slack which is being made, and good slack continues rather scarce; but the commencement of the winter demand for house coal will soon place considerable supplies of slack upon the market, while the unsettled state of the cotton trade will have a material effect upon the demand. The average prices at the pit mouth remain about as under:—Good Wigan Arley, 7s. 6d. to 8s.; seconds, such as inferior Arley and Pemberton four-feet, 5s. 9d. to 6s. 6d.; common Wigan mines, 4s. 6d. to 5s.; burgy, 3s. 9d. to 4s. 3d.; good slack, 3s. to 3s. 6d.; and common about 2s. 6d. per ton.

Rather more coke is going into some of the iron-making districts, but the general demand continues very dull, and the Manchester Corporation have reduced the price of their gas cokes, which at the works are now quoted at 5s. per ton for the best, and 1s. 8d. for the seconds; made cokes at the ovens are quoted at from 9s. to 12s. per ton, according to quality.

The iron trade has been extremely dull during the past week, and prices generally have been easier. Lancashire makers of pig iron still quote 49s. to 50s. per ton, less 2½ for delivery into the Manchester district, but Lincolnshire and Derbyshire brands are offered at under these figures. For bars delivered into the Manchester district the average price is now about £6 to £6 2s. 6d per ton.

THE SOUTH STAFFORDSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Cokes and iron-making fuel may be said to be receiving a steady demand in this district, as also are a few other qualities, but gas coals are selling but slowly at present. Furnace fuel is that which is claiming the best call, though underselling is still rife, and greatly complained of. The ruling price is 7s. 6d. per ton, though a lower figure is readily found. In the neighbourhood of Cannock and Hednesford the collieries are better employed, but at a few pits only is full time made. The demand for the iron-making industry is the greatest feature in the coal trade at present. A few pits being closely situated to the Dudley side of the manufacturing district are an exception, and on the whole there is great room for improvement. With the near approach of the winter season, and a continuance in the better state of the iron trade, there are prospects of a better look-out. In the Dudley district three or four additional furnaces have been added to the number in blast, and one or two others are shortly to be got ready for business operations. As compared with the number in blast a year ago there is a more satisfactory state of things prevailing. The output of pig iron, too, is greater than it is generally considered to be, and for several months past the increase has been steady. During the past few days, however, the quantity turned out has not been so large as usual, but the near approach of the quarter's end, as a rule, affects the output. The full state of the market in the Middlesbrough production has also had its effects on the South Staffordshire make, and, as a consequence, prices have been scarcely so firm. For manufactured iron there is still a fair demand, and a better inquiry for several classes—notably sheets, girders, plates, and tube-making iron—is apparent. Contracts for forward delivery are more numerous, though low rates are still held out for, and sometimes obtained. Common sheets are selling freely at £10 to £11; rods, chain-making iron, cotton ties, and such like, are in greater request. Marked bars are dull, but the run on unbranded sorts is a characteristic feature of the markets. Part mine and cinder pig are the most looked after of the raw material, several parcels having changed hands during the week, at prices ranging up to £3 10s., and even higher figures are reported. Hematites are quotably firm. Ironstone and cokes are active, and prices are somewhat stiffer than they were a week ago. In the heavy iron foundry department, good average orders are on hand,

and recent mails from India, Australia, and the Cape have added respectable lines to the number. Tube makers are, on the whole, well occupied, but the newly advanced lists have brought about a slight check. Galvanizers are those who are experiencing the greatest share of improvement in business; they are tolerably full of orders on export account, and are negotiating for substantial parcels of sheets. Miners meetings have been held during the week, calling upon the colliery owners to increase prices, which they maintain are, as at present standing, ruinous to masters and men.

THE YORKSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The finished iron trade throughout Yorkshire, although exhibiting not much alteration, holds pretty well up. There is also a fair output of pig iron from the furnaces in blast, which of late have undergone but few changes. Very little iron ore is now raised at the South Yorkshire pits, so that supplies are for the most part obtained from North Lincolnshire for the South and West Yorkshire furnaces. In the North Riding or Cleveland district the output is well sustained. Last year 4,750,000 tons were raised, which is valued at £712,500, as compared with 3,325,582 tons in 1869, which was then assessed at £831,359. It will be observed that although the output last year was greater, the value is less in proportion to what it was ten years ago. It is stated that great difficulties exist as to assessing the value, owing to much of the ore being consumed by furnaces in Cleveland, as well as from the fact that a large proportion is being supplied under contract made many years ago, and having many years to run. The present value is fixed by the ore being estimated at from 2s. 9d. to 3s. 3d. per ton net at the mines. There is very little doing at the local foundries, where colliery and builders castings are chiefly made; but at several places where gas-pipes and apparatus are produced business continues very fair. Makers of Bessemer steel rails, tires, and axles have no cause to complain.

The steam coal trade maintains its position, and during the week the West Riding pits have sent a full average tonnage to Hull and Goole. From the collieries in the southern part of the coal-field the quantity despatched by water has been large, several of the leading pits having canal accommodation having large stacks on hand, which they can supply whether the pits are at work or not. The tonnage to Grimsby is above an average one, whilst the port is within easy reach of the South Yorkshire district, from which the coalowners enjoy the same rate as they pay to Hull.

The contracts for gas and locomotive coal are being quickly executed, and those companies which secured them are working pretty well. A great change has this year come over some of the pits which for years have enjoyed part of these contracts, but declined to tender at the low rates at which it is said they were placed. There is nothing new to note with regard to manufacturing fuel, which is not over good to sell, although slack can be purchased for little more than the men have for getting and sending it out. The quantity of small coal which the colliers are producing is being taken notice of, and at one of Earl Fitzwilliam's pits where disputes exist a machine has been fixed to test the quantity.

The position of the labour market is a very unsatisfactory one. A conference was held at Barnsley early in last week for the purpose of considering the best means of improving the position of the men. It was resolved to federate the three existing South Yorkshire Unions, and urge the men to work only eight hours per day; all men and boys out on strike to be supported. The most important of the propositions will be hard to carry into effect, as the men are now only working about three or four days per week, and are doubtless desirous of making all they can when the trade allows them to work. With regard to the promise held out to support the men, it is well known that none of the associations have any funds. The Silkstone pit at the Wharncliffe Silkstone Colliery is still closed, and will be unless the miners choose to submit to 10 per cent., and all underground labourers to a similar reduction. The owners would, however, reopen the pit if the colliers engaged in the Thorncliffe, Parkgate, and Silkstone seams would agree to sacrifice 5 per cent., and the other underground workmen 10 per cent. The men have declared not to concede the reduction. The Wheatley Wood pit, belonging to the Woolley Coal Company, between Wakefield and Barnsley, is still closed, and likely to be so, as the owners are removing the rails and timber from the underground workings.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The shipments of coals from the Tyne and Wear were rather kept behind last week through stormy weather at sea; but notwithstanding this fact, the quantity of gas coals sent coastwise and abroad by steamers and sailing vessels has been an average. Some contracts have been made for the supply of gas coals over the winter. The price was fully up to recent quotations; but a slight advance was reported in some instances, though if there was it was very slight indeed. The market is pretty strong undoubtedly, but there is too much competition amongst medium and second-class collieries for the market to be forced. The steam collieries are working pretty well. Some sorts of small coals, especially steam, are quoted at a low figure. The business doing in coke for exportation shows an improvement as the autumn draws on. Shippers are wishful to get their orders away to the Baltic whilst the fine weather lasts.

The coasting business of last week exhibited something like a rise of 3d. per ton in freight all round. This is usual in September. Sailing vessels have been engaged to load gas coals for Dublin and Cork at 7s. per ton. Ships of medium size have also been taken to carry gas coals to the southern ports; the steamers which ply in the gas trade to London and the larger ports over the year are fully employed. The large gas-works on the Continent are making up their stocks.

Iron manufacturers and merchants are greatly disappointed with the position of their trade this autumn. It has fallen quite short of expectations. Finished iron is sold at lower prices than it was a week or ten days ago. The prospects are not good. A few more inquiries and orders have been received for cast-iron pipes; otherwise there has been no change in the ironfoundry branch. The season is fast running through for the exportation of fire-clay goods. The best houses, however, do not experience any falling-off yet; but second-class establishments have a difficulty in keeping themselves supplied with orders, and they ask lower prices.

A reaction has occurred in the lead trade. Prices are nearer £2 than £1 lower than they were a month ago, and the market has a drooping tendency. There have been rather large arrivals of lead in the Tyne, from Spain and Germany. The position of the general manufacturing trade of the North of England is not unsatisfactory in many respects, as the business which is transacted is for *bonâ fide* sale. Chemicals continue to be low in price, and the market is singularly inanimate. There appears to be a scarcity of business from the Continent, and prices did not alter last week. At the same time, stocks are low.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

It has just been resolved by the Bathgate Municipal Authorities to make such extensions at the gas-works under their management as will fit them for supplying the town with gas made in the usual manner from coal. This action on their part has been rendered necessary by the determination on the part of Young's Paraffin Light and Mineral Oil Company to decline making gas for the town any longer. It may be mentioned that for many years the lighting material for Bathgate has been the residual gas of the shale oil manufacture, that product of the distillation of shale which has hitherto practically refused to yield any condensable oils or light hydrocarbon spirits or naphtha.

The Thurso Gas Company have made a commencement with the laying of pipes through the town in connection with the new works that have been some time in progress. It is expected that the operations will be finished early next month, when the gas will in all probability be turned on by Sir Tollemache Sinclair, Bart., M.P., arrangements having been made to extend the gas supply to Thurso Castle, the hon. baronet's residence, as also to several streets of the new town.

A good deal of interest has been excited during the past week by the proceedings in the Valuation Appeal Courts throughout Scotland. There were several cases in which appeals were made against assessments on gas-works. One appeal was made on the part of the Joint-Stock Gas Company, Falkirk, against the valuation which had been made by the assessor on their property as a going concern. The proposed assessment amounted in all to £576, which, it was mentioned, was the highest in Falkirk, excluding the Falkirk Iron-Works, and besides that amount there was an assessment of £100 on the gas-mains outside the burgh—or a total of £676. After the matter was considered at some length, the assessment was reduced by the Court from £576 to £500. The valuation of the works of the Galashiels Gaslight Company had been raised by the new assessor from £110 to £1250, against which an appeal was raised, which led to an interesting discussion between the law agent for the Company and the assessor. Eventually the valuation was fixed at £1000, being a rise of £590. Such an increase will probably influence the price of gas in an upward direction next year. At present it is 3s. 4d. per 1000 cubic feet. The valuation put on the Penicuik Gas-Works was £695, or nearly three times what it was last year. An objection was raised on behalf of the Gas Company; but after the matter had been discussed at some length it was repelled by the Court, the assessor stating that the assessment had been made in the usual way. The most important case brought forward in the Dundee Burgh Appeal Court was one in which the Gas Commissioners were involved, their works having been assessed at £14,907. On behalf of the appellants, their Clerk, Mr. Thornton, asked that a deduction of 15 per cent. should be allowed on two-thirds of the working expenses, as tenants profits, reducing the sum to £10,896; and that there should be a reduction for repairs, renewals, or insurances. A very long debate took place on the subject, and Mr. M'Crae, the Manager, was examined at some length, and the result was that the Court reduced the valuation to £14,232, which did not satisfy Mr. Thornton, who intimated that he would appeal to the Court of Session.

Considerable anxiety still exists in regard to the condition of Knowesdean reservoir, an important part of the new water-works for Galashiels. It is still found to be leaking, apparently beyond all hope of remedy. It has been in the hands of the engineers and contractor for about two years and a half, and during all that time it has never yet been filled. The aim of the engineers was that it should contain 6 million gallons, or a supply for 15 days. The town is at present supplied by a service-pipe from the Caddon direct, from a point to the north-west of Knowesdean reservoir. It is the intention of the Town Council to visit the works in a body, and inspect the leaking reservoir along with the engineers, Messrs. Leslie, Edinburgh.

At a meeting of the Finance Committee of the Edinburgh and District Water Trust, held on Friday, the Treasurer's estimates were generally approved of, and the Committee agreed to recommend that the assessment should be at the rate of 9d. per £1 of rental for the domestic water-rate, being 1½d. of an advance on that of last year; 2d. per £1 as shop rate; and 1d. per £1 as the public water-rate. In view of this increase in the rate, it was thought by the Committee that this was not a suitable time for making any reduction in the price of water supplied to manufacturers for manufacturing purposes, and upon that subject it was agreed that no recommendation should in the meantime be made.

The annual visitation of the Aberdeen Water-Works was made by the members of the Town Council last Wednesday, one of the company being Mr. Washington Lyon, Chairman of the General Purposes Committee of the Common Council of the City, who is now visiting Scotland to inspect the various systems of water supply for the large towns. At the luncheon which followed the inspection, the Chairman of the Water Committee, Bailie Donald, said that when the water supply scheme was started the domestic water-rate stood at 1s. 3d. per £1 of rental, whereas at the present time it was only 7d., and it was most probable that next year it would be reduced to 6d. The Dundee rate was stated to be 1s. 4d.

There was a rapid decline in the price of pig iron last week, amounting in all to 2s. 8d. per ton. The market closed on Friday with the price at 50s. cash and 50s. 2d. one month for buyers, and sellers asking 1d. higher. Manufactured iron is quiet, and prices are a shade easier.

No further change of any marked importance has taken place in the coal trade. The strike has quite collapsed, and prices are now declining.

LUTON WATER COMPANY.—The ordinary general meeting of this Company was held on the 27th ult.—Mr. Mees in the chair. The report presented by the Directors stated that the accounts for the half year ending June 30 showed a balance of net profit of £1154 5s. 8d., as against £1014 10s. 7d. for the corresponding period of the previous year. Adding to this balance the amount brought forward from last half year—£93 14s. 2d.—and deducting the interest paid on mortgage loans, and Directors and Auditors fees, there remained for disposal £1120 17s. 10d., out of which the Directors recommended the payment of the maximum dividend at the rate of 10 per cent. per annum, carrying forward the balance of £120 17s. 10d. The Directors reported that the application recently made to the Board of Trade, under the Gas and Water Works Facilities Acts, 1870 and 1873, for an Order to empower the Company to raise additional capital, had received the Royal Assent. The Company's Engineer reported that the plant and works were in fair working order. In moving the adoption of the report, the Chairman remarked upon the rapid progress and financial success of the Company, and congratulated the Shareholders on obtaining authority to raise £15,000 more capital, paying 7 per cent., without any opposition or difficulty. With reference to the new capital, he stated that the £10,000 issued had been allotted, and £1 per share called up on deposit. With the additional capital, new engines would be provided to meet the requirements of the town. He referred to the report generally, and remarked on its satisfactory character. The motion was seconded by Mr. Higgins, and carried unanimously, and the maximum dividend was declared. Mr. G. Bailey was re-elected a Director of the Company, and he meeting closed with a vote of thanks to the Chairman and Directors.

Reduction in the Price of Gas at Conisborough.—The Directors of the Conisborough Gas Company, Limited, have given notice that, from the 1st prox., the price of gas for private consumption will be reduced from 6s. 8d. to 5s. 10d. per 1000 feet.

Proposed Purchase of the Newtownards Gas-Works by the Town Commissioners.—The Newtownards Town Commissioners having had under consideration the question of taking over the gas supply, they appointed Mr. A. Silverthorne, C.E., to act for them in valuing the works of the Gas Company, and he and Mr. G. Anderson (on behalf of the Company) entered upon their inquiry on the 10th inst., and on their joint report the Commissioners will determine whether or not they will pursue the matter further. The price charged for gas is 7s. 6d. per 1000 feet—a price which the Commissioners consider too high, and which they hope to be able to reduce by their acquisition of the works.

Barnstaple Water Company.—The half-yearly meeting of this Company was held on the 30th ult.—Mr. H. K. Thorne in the chair. The Directors reported that the revenue account for the half year ended June 30 last showed a balance of £803 18s. 5d. After providing for the cost of reconstructing the head weir, there would remain £639 3s. 9d. to be appropriated as the Shareholders might determine. The Directors recommended the declaration of a dividend of 9s. per share, leaving a balance of £89 3s. 9d. to the credit of the next half year's account. The Chairman, in moving the adoption of the report, said he thought the increased dividend would commend it to the Shareholders. The dividend for the last four years had been 8s. per share; but during that time considerable expenditure had been incurred in various parts of the works. The Directors hoped that now they had reached 9s. per share they would be able to keep to it. The motion was carried, and the dividend recommended was declared. A vote of thanks was passed to the Chairman, and the proceedings terminated.

Shoreham Water Company.—An extraordinary meeting of this Company was held on Saturday, the 11th inst.—Dr. Fuller in the chair. A report was read from the Directors, stating that in consequence of the large increase of the business of the Company, they had been obliged to lay down a much larger quantity of pipe than originally contemplated, the expense of which, added to the cost of an additional reservoir, necessitated the raising of further capital. The Directors, therefore, recommended that a sum of £2000 be raised by the issue of 5 per cent. preference shares, and a further £2000 by way of mortgage, on the security of the undertaking. The Chairman, in moving resolutions carrying out the recommendations of the Directors, congratulated the Shareholders upon the success of the Company's operations. There was, he said, not the least doubt that the revenue of the Company would be ample to provide the interest and dividends on the mortgage and preference stock, and leave a balance sufficient to pay the original Shareholders a substantial dividend. The new works had already commenced to be remunerative, and the additional capital was required in a great measure for the works upon which a revenue would immediately accrue. Formal resolutions were then adopted in accordance with the recommendations of the Directors, and the proceedings concluded.

Camborne Water Company.—The half-yearly general meeting of this Company was held on the 26th ult.—Mr. W. Cole in the chair. The Directors, in their report, congratulated the Shareholders on the increasing success of the undertaking. The half year ending June 30 showed a considerable improvement on all preceding ones. The revenue account, with all expenses fully charged, showed a profit on the six months working of £277 12s. 4d., against £235 9s. 8d. for the previous half year; and, after allowing half of the year's rent of reservoir lands then charged, the profit would be £119 17s. 3d. in excess of the corresponding six months of 1879. The very largely increased consumption of water, together with the unusual drought during the spring and early part of the summer, had tested the Company's capability of supply, and the Directors were pleased to state that at present they had no reason to anticipate any deficiency of water. They recommended that a dividend of 4 per cent. per annum be declared. The Chairman, in moving the adoption of the report, mentioned that the 4 per cent. dividend recommended would absorb £224. The profit made was within a very pounds of 5 per cent., and he hoped the Directors would be able to pay that at the next meeting, and he had little doubt they would be able to do better in the future. The report was adopted, and the dividend recommended agreed to.

Stockton and Middlesbrough Corporations Water Supply.—At the monthly meeting of the Stockton and Middlesbrough Water Board, held on Monday, the 13th inst.—Mr. T. H. Bell in the chair—a long discussion took place upon the report which the Joint Clerks handed in, relative to the advisability of applying to Parliament for additional powers for the purchase of land, pumping facilities, &c. The Chairman said he would suggest the Board coming to some determination as to the probable future growth of the district and its water requirements, and then ask their Engineer (Mr. Mansergh) as to the best mode of providing for those requirements. He thought it probable that allowing for an increased consumption of 20 million gallons of water per week over the next 10 or 15 years would be near the mark; or, in other words, that in the year 1900 their consumption would be about 80 million gallons. In the scheme of 1876 very much more water was asked for than was required; but this was no longer the case, as they were carrying out in full the engagements then made. He hoped they would meet no opposition if they went to Parliament. Mr. Dodds, M.P., moved—"That the respective Corporations be requested to consider the report from the Joint Clerks, and what action should be taken thereupon." Alderman Bulmer opposed the motion as inviting an application to Parliament. Several other propositions having been brought forward, it was eventually agreed that Mr. Mansergh be instructed to consider and report to the Joint Clerks, and advise the Board at an early date what he considers the best course to adopt to meet the requirements of the district, supposing the demand to rise to 80 million gallons per week in the next ten years.

Sevenoaks Gas and Water Supply.—At the meeting of the Sevenoaks Local Board on Monday, the 6th inst.—Mr. H. Thompson in the chair—Major German moved a resolution to the effect—"That a Committee be appointed to consider and report upon the present and future supply of gas and water in Sevenoaks, and on all matters relating thereto." He thought all the members of the Board would approve having some inquiry into the present and future supply of gas. One of the grounds he went upon was that they were paying a great deal more for their gas than they ought to do, also that an intimation had been given to him that the Gas Company intended to go to Parliament next session for further powers. Therefore they had better bestir themselves to get a reduction before it was too late. The price—4s. 7d. per 1000 feet—was particularly excessive to small consumers, although it was not so bad to the large consumers, who were allowed 10 per cent. off their accounts, and if the Committee were appointed they would be able to find out the prices charged in towns similarly situated to themselves. He had read that at Ashford the price had been reduced to 4s., and he did not think there was much difference as to the carriage of coals so far as the two places were concerned. The Company, after taking the reasonable profit they were entitled to, ought to supply gas at 3s. 6d. per 1000 feet, and if the Board would show a firm attitude he thought they would get what they wanted, while the Company would not think of going to Parliament for further powers. Mr. Bowen seconded the motion, and it was unanimously agreed to. Major German then moved a resolution with regard to the water supply. Mr. Bowen was opposed to the appointment of a Committee on this subject, thinking that the question of the gas supply should be disposed of first. This being the general feeling, the resolution was withdrawn, and the Board proceeded to other business.

Another Drainage Difficulty at Horsham.—Under this heading the *West Sussex Gazette*, in last week's issue, says: "The Local Board of Horsham seem to be most unfortunate in their drainage scheme. Hardly has an expensive arbitration case, arising out of damage to land in carrying out the drainage, been tided over, than another and a very serious difficulty arises. In their anxiety to purify the town it appears that the Local Board have managed to pollute the River Arun to such a degree as to be highly dangerous. We learn that a hastily convened meeting of the Board was held on Thursday evening, to take into consideration a letter received from Mr. A. C. Coole, a local Solicitor, on behalf of Mr. John Stanford, of Broadbridge Mill, calling the attention of the Board to the fact that the River Arun was contaminated to a dangerous extent by an overflow of sewage matter from the Board's works; that the fish were killed and floating dead upon the top of the water in large numbers, in consequence of the pollution; and asking the Board to take some steps to remedy the nuisance. That such a nuisance does exist was testified to by no less a person than the Medical Officer of the Board, who said that there could be no doubt about the matter. The river was terribly polluted, and the pollution was caused by sewage matter. It had been gradually getting worse and worse, and the smell was most objectionable. The polluted water could be seen till it came to the Board's sewage works, and, at the works, he must say that things were in a most unsatisfactory state—the sewage had washed away a portion of the bank, and was overflowing into the river; the filtering-beds had not been emptied for some time; and, in his opinion, sewage matter was getting into the river at three or four different points. Such a state of things is very distressing. Some attempt was made to cast the blame upon the Gas Company, but they were proved to be innocent in the matter. Then it was said that several householders had neglected to drain into the sewer, and drained directly into the river by means of an old drain. Whatever may be the cause, there is no doubt, as the Chairman of the Board remarked, it is the duty of the Board to grapple with the difficulty. This they expressed their intention to do, and we hope they may be successful. Since placing themselves in the hands of 'eminent engineers,' the Local Board of Horsham seem to have had their hands full. We wish them and the ratepayers well out of their new difficulty."

South Essex Water-Works Company.—The ordinary general meeting of this Company was held on the 24th ult.—Mr. W. C. Fooks in the chair. The Secretary (Mr. C. J. Fox) presented the report and accounts, from which it appeared that the working of the undertaking for the half year ending June 30 had resulted in a very trifling profit, mainly attributable to the extraordinary expenditure which had been incurred. The total balance to the credit of the profit and loss account for the entire year amounted to £645 17s. 1d., without bringing into account any Directors or Auditors fees. The provision of additional engine power had become a necessity of the undertaking, and an extraordinary outlay of about £400 on this account would have to appear in the next half year's account. The Directors were fully convinced that important alterations, both in reference to mains and storeage, involving considerable outlay, had also become necessary, both with the view of increasing the facilities of supply and reducing working cost; but the Directors proposed to call in additional engineering advice before committing the Company to any such outlay. The works for this purpose and the outlay thereon would in all probability necessitate an application to Parliament for additional powers, and if such an application were made the Directors contemplated that it would be advisable to endeavour to obtain an extension of the Company's district. Before this, however, the Shareholders would be consulted, and the views of the Directors fully explained at a special general meeting. The Directors had, as hitherto, been watching the proceedings in Parliament upon the question of the Metropolitan Water Supply, and they continued to give attention to all matters connected with this subject that might be conducive to the advantage of the Company. In the present condition of the Company's finances there was no sufficient margin on which the Directors could recommend the payment of a dividend. They however, reminded the Proprietors that the undertaking now produced a considerable revenue, and had a very large earning power, and that the continually increasing demand for water in the district afforded substantial encouragement for perseveringly adopting, under judicious advice, every possible means of meeting the demand in such a manner as would yield a profitable result to the Shareholders. The Chairman having briefly touched on the items of the report and accounts, moved their adoption, which was carried, and the proceedings terminated.

Register of Patents.

APPLICATIONS FOR LETTERS PATENT.

3575.—Singleton, T., Over Darwen, Lancs, "Improvements in taps or cocks for water and other fluids, steam, and gases." Sept. 3, 1880.

3607.—Jenner, H. W. T., Handsworth, Stafford, "Improvements in gas-engines." Sept. 4, 1880.

3624.—Lake, W. R., Southampton Buildings, London, "Improvements in apparatus for the manufacture of gas." A communication. Sept. 6, 1880.

3626.—Jackson, F., Nottingham, "Improvements in pipes and pipe joints." Sept. 7, 1880.

3630.—Peebles, D. B., Bonnington, N.B., "Improvements in and connected with apparatus for governing or regulating the flow or pressure of illuminating gas." Sept. 7, 1880.

3639.—Woodward, J., Manchester, "Improvements in valves for gas and other fluids." Sept. 8, 1880.

3641.—Groth, L. A., Finsbury Pavement, London, "Improvements in the method for decomposition of salts of ammonia, and in apparatus used therefor." A communication. Sept. 8, 1880.

3678.—Foulis, W., Glasgow, "Improvements in apparatus for purifying and cleansing gases, the same being applicable for separating gases or vapours from liquids." Sept. 10, 1880.

3681.—Stephan, J. A., Worcester, "Improvements in the manufacture of heating and illuminating gases, in the apparatus to be used in such manufacture, and in the means employed for the incandescence of the said gases." Sept. 10, 1880.

3685.—Williams, H., and Malam, J., Southport, Lancs, "Improvements in and relating to atmospheric air and gas-motor engines." Sept. 10, 1880.

3695.—Parker, J. F., Gravelly Hill, Warwick, "Improvements in the manufacture of gas for illuminating and heating purposes, and for melting and reducing metals from their ores." Sept. 10, 1880.

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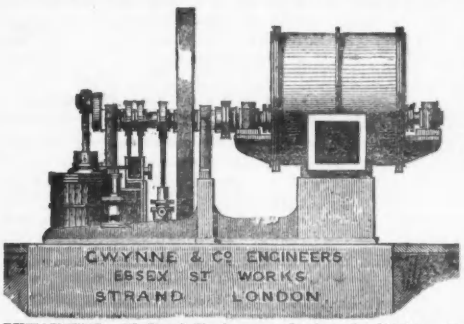

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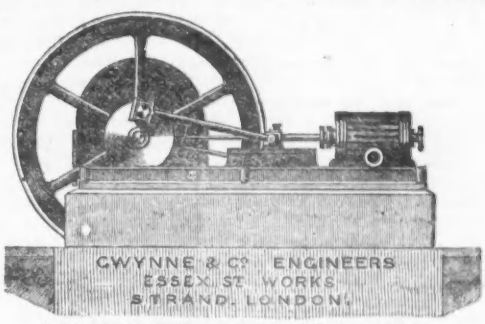

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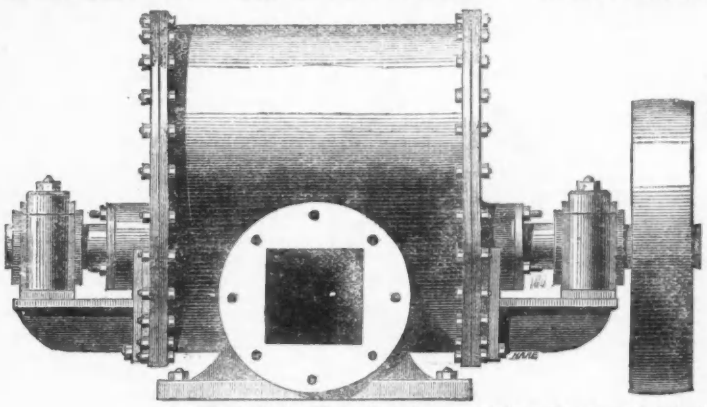


WITH OR WITHOUT
WROUGHT-IRON SPINDLES AND
ENGINES COMBINED.

GEORGE WALLER & CO.,
MAKERS OF
ENGINES, EXHAUSTERS,
INDEX AND DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, AND OTHER PUMPS,
SCRUBBERS AND PURIFIERS,
CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

PHŒNIX ENGINEERING WORKS:
HOLLAND STREET, SOUTHWARK, S.E.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, Masonic Votes on behalf of a Child of the late Bro. William Clark Watson, who was a Subscribing Member of the "Frederick Lodge of Unity," No. 452, a Member of the British Association of Gas Managers, and late of Kingston-on-Thames.
Votes thankfully received by Bro. MAGNUS OHREN, Lower Sydenham, KENT, S.E.

WANTED, by the Advertiser, a Situation as CLERK in Charge or FOREMAN, or in any place of trust. Nine years first-class character.
Address No. 693, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A Gentleman, possessing a thorough Knowledge of Gas-Meters and the Meter Trade, wishes to Represent a Firm on Commission and Expenses.
Address No. 692, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER, aged 36, wants Situation in a Gas-Works. Can Set Retorts, Lay Mains and Services, Repair and Test Meters. Six years in last situation. Good references and testimonials.
Address JAMES SURL, 18, Dorchester Place, Blandford Square, LONDON, N.W.

TO GAS COMPANIES AND METER MANUFACTURERS.

THE Advertiser seeks an Engagement in the Meter Department of a Gas Company or Meter Factory, having had considerable experience in the manufacture of Wet and Dry Meters; also every description of Experimental Apparatus, and the Management of Workmen. Would not object to an appointment abroad. 25 years testimonials.
Address A., 12, Bernard Street, Russell Square, LONDON.

WANTED.—The Advertiser, a Young Man, aged 39, married, is open for an Engagement as MANAGER and SECRETARY of a medium-sized Gas-Works, or SUB-MANAGER of a large Works. Has a thorough Knowledge of the Manufacture and Distribution of Gas in all its branches, having had sole management of Gas-Works for 16 years. Highest testimonials and references.
Address No. 678, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

NEWPORT (SALOP) GAS COMPANY.

WANTED, a Married Man, as Working FOREMAN at the above Gas-Works. Must be accustomed to Fittings, &c. Good house, garden, and premises supplied.
Apply, by letter, stating age and experience, with references, to Mr. R. N. HEANE, Secretary, Newport, SALOP.

CORPORATION OF BIRMINGHAM—GAS DEPARTMENT.

THE Gas Committee are about to appoint an ASSISTANT SECRETARY. Salary £200 a year.
Applications for the appointment to be made, by letter only, marked "Assistant Secretaryship," before the 7th of October. Candidates to state their age, which should not exceed 35, qualifications, and present occupation. Copies of not more than two testimonials may be sent.
A previous acquaintance with the work of a gas undertaking is not essential.
EDWIN SMITH, Secretary.
Offices of the Gas Department, Old Square, Birmingham.

WANTED, by the Dumfries Gas Corporation, 900 yards 3-in. T and B PIPES; weight 1 cwt. 3 lbs. to the pipe of 9 ft. lengths. Proved at 200 ft. water pressure; and warranted to be perfect, of the very best make. Delivered free at the Dumfries Station. Each length of pipe to be stamped in relief letters D. G.
Tenders to be lodged with WM. MARTIN, Clerk to the Gas Commissioners, within seven days after 21st current.
Town Hall, Dumfries, Sept. 13, 1880.

NEW ROMNEY GAS COMPANY, LIMITED, KENT.

WANTED to Purchase, Purifier for Gas-Works, 7 ft. by 4 ft. or 8 ft. by 5 ft., with Bye-pass. Single or double.
Send terms, &c., to the SECRETARY.

SLEAFORD GAS COMPANY, LIMITED.

FOR SALE—Single Gasholder, 32 ft. by 14 ft., Counter-balanced, Connections and all complete, in good condition. Reason for removal, ground wanted.
Particulars to be had of HARRY WIMHURST.

ON SALE—The Cast-Iron Fire Doors, Mouthpieces, Ascension, H, and Dip Pipes, Hydraulic Mains, &c., belonging to six settings of six retorts; One Station Meter to pass 8000 feet per hour (makers West and Gregson); also nine D-shaped clay retorts, 16 in. by 14 in. by 8 feet.
The above are in capital condition, and can be seen at the Gas-Works, Guildford. No reasonable offer refused.
Further particulars on application to Mr. LONGWORTH, Gas Offices, GUILDFORD.

PLANT FOR SALE.

THE Elsecar Gas Company, near Barnsley, have FOR SALE the following PLANT (Thorncliffe patterns and make):—
3 Ash-Pans, with 3 furnace-doors, frames, and fire-bars.
11 Mouthpieces, 15 in. by 13 in.
11 Flange and Socket Pipes to fit.
11 Spigot-Pipes.
11 Arch-Pipes for same.
2 lengths Hydraulic Main, one for five retorts, and two for three retorts.
22 Mouthpiece Doors.
11 Door-Screws.
1 Condenser, with tar-box and 16 6-in. pipes.
3 Syphons and Bye-passes.
1 Scrubber, with dry-faced bye-pass, water distributor, and grates, all 6-in. connections.
To be sold cheap, and application to be made to Mr. H. C. OATES, at the Elsecar Gas-Works, or to THOS. WEYFIELD, Secretary, High Street, ROTHERHAM.

FOR SALE.—In consequence of the decease of Mr. Milne, a GAS-WORKS in a small Manufacturing Town in Ulster. Present make 1½ millions, which might be increased.

For particulars apply to ALEXR. MILNE AND CO., Gas-Works Lessees and Engineers, 11, Chichester Street, BELFAST.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—

About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12-in. Slide-Valves and 12-in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12-in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

Exhauster (Beales) to pass about 25,000 feet per hour.

Two Vertical Steam-Engines, each about 6-horse powe with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

4-horse power Horizontal Steam-Engine.

Three 4-in. Pumps, with cranked Shafting and a pair of Mitre Wheels.

Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.

Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.

Gasholder, Double Lift, capacity 100,000 feet.

Gasholder, Double Lift, capacity 240,000 feet.

One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.

Two 12-in. four-way faced Valves, by Cockey.

For further information, &c., apply to the undersigned.

R. MORLAND, Engineer.

LOANS.

A Small old-established Provincial Gas Company, secured by Provisional Order, and having a clear net income of £800 per annum, is desirous of BORROWING a sum of £3300 at 5 per cent. per annum on Debenture Stock, to be laid out in Extensions of the Plant, the Stock to be transferable in sums of Five pounds, or any multiples thereof. No Debenture Stock or Bonds having been issued up to the present time, this Stock will be the first charge upon the undertaking.

Applications to be made before the 1st of October next to W. LIVESEY, 6, Victoria Street, WESTMINSTER, S.W.

SOUTHPORT CORPORATION GAS-WORKS.

TO IRONFOUNDERS AND OTHERS.

THE Gas Committee invite Tenders for the Supply and Erection complete of a Cast-Iron ROOF required at the Gas-Works, Crowlands.

Plans and specification may be seen at Mr. Booth's Office, Eastbank Street, Southport.

Tenders, endorsed "Roof," to be sent in to me not later than Wednesday, the 29th inst.

By order,
J. H. ELLIS, Town Clerk.

Town Hall, Southport, Sept. 16, 1880.

THE Eccleshill Gas Company invite TENDERS for the Surplus TAR and AMMONIACAL LIQUOR to be produced at their Works, together or separately, for One year, from the 1st of October next. Can be delivered in Contractors tanks, if required, at Eccleshill Station (G.N.R.) Coal carbonized, per annum, 1500 tons.

Tenders, sealed and endorsed, to be sent to the undersigned not later than Monday, the 4th of October next.

J. MELLOR, Secretary.

Gas-Works, Eccleshill, near Leeds, Sept. 16, 1880.

THE Directors of the Rochester, Chat-ham, and Strood Gaslight Company are prepared to receive TENDERS for the Erection of Four PURIFIERS with all necessary Valves, Connections, and Lifting Gear, according to specification which may be had on application, and drawings, which can be seen at their Office, 56, High Street, Rochester.

Sealed tenders, endorsed "Tender for Purifiers," to be delivered at the Office as above, before noon of Thursday, Oct. 14.

By order,
WILLIAM SYMS, Secretary and Engineer.

Sept. 2, 1880.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their Surplus TAR, for One year from the 1st of October next. Probable quantity from 140,000 to 160,000 gallons. Delivery on Company's Works, filled into purchaser's tanks. Payments, cash monthly.

Sealed tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Monday, the 27th of September next, but the Directors do not bind themselves to accept the highest or any tender.

W. A. PADFIELD, Secretary.

Gas Offices, North Street, Exeter, Sept. 7, 1880.

CHESTER UNITED GAS COMPANY.

Sale by Tender of £10,000 of Ordinary Stock, being a portion of the additional Capital authorized to be raised by Resolution passed at a General Meeting of Proprietors, held on the 9th of August, 1880, in pursuance of the powers of the Chester Gas Act, 1880.

THE Directors of the Chester United Gas Company give Notice that they will be prepared to receive, not later than Ten o'clock a.m., on Thursday, the 7th day of October, 1880, sealed TENDERS for £10,000 of ORDINARY STOCK, bearing a maximum dividend of £7 per cent., in Lots of £100 each nominal value.

The Capital now offered is required for the Extension of the Company's Works, to enable them to meet the increased demand for Gas.

Forms of tender can be had at the Offices of the Company, at the Roodee, Chester, or will be sent by post on application.

By order,
JAMES PYE, Secretary.

Gas Offices, Roodee, Sept. 6, 1880.

THE BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given that the HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at this Office on WEDNESDAY, the 29th inst., at One o'clock precisely, to transact the usual business, to declare the Dividend for the Half Year ending the 30th of June last, and to elect two Directors and one Auditor in the place of those who go out by rotation, but who are eligible to be re-elected.

Notice is hereby also given that the Transfer Books of the Company will be closed on the 17th, and re-opened on the 30th inst.

By order of the Court of Directors,
FREDERIC LANE LINGING, Secretary.

Chief Office, No. 11, George Yard, Lombard Street, London, E.C., Sept. 8, 1880.

THE Directors of the Horsham Gas Company, Limited, invite TENDERS for their Surplus TAR and AMMONIACAL LIQUOR until Midsummer, 1881.

The quantity for disposal is expected to be about 500 barrels of Tar and 300 of Liquor.

No one barrel to exceed 40 gallons.

The purchaser to provide barrels, when required, and to pay all railway charges.

The Company to pay all charges between their Works and the Horsham railway station.

Tenders to state the price offered for Tar per barrel, and a scale of prices for Liquor of 4, 5, and 6 degrees of Twaddel's hydrometer.

Payments to be made quarterly.

Sealed tenders, endorsed "Tender," to be sent to the undersigned on or before Saturday, Oct. 9.

ROBT. SHEPPARD, Secretary.

CITY OF LIVERPOOL.

TO PIPEFOUNDERS.

THE Council of the City of Liverpool are desirous to receive TENDERS for the Supply of about 8000 Tons of Cast-Iron SOCKET-PIPES and other Articles connected therewith.

Drawings and specifications may be inspected at the Office of the Water Engineer, Municipal Offices, Liverpool, on and after Monday, the 13th of September inst., where copies may also be obtained, at the cost of two guineas each, to be returned to any person or firm from whom a *bona fide* tender shall be received.

Tenders are to be delivered at my Office, in Liverpool, on or before Wednesday, the 29th of September inst.

The Council do not undertake to accept the lowest or other tender.

By order,
JOSEPH RAYNER, Town Clerk.

Liverpool, Sept. 7, 1880.

TO METER MANUFACTURERS.

THE Gas Committee of the Corporation of Warrington are prepared to receive TENDERS for One STATION-METER to pass 60,000 cubic feet per hour, under a pressure of three-tenths, with Bye-pass and 18-in. Connections. Also a 20-in. STATION GOVERNOR to be actuated by water, 20-in. Connections, two Hydraulic and one Slide-Valve, with pillar for Bye-pass; the whole to be erected complete on their Works at Warrington.

Sealed tenders, endorsed "Tender for Station-Meter," must be delivered to the undersigned not later than Thursday, the 14th of October next.

The Committee do not bind themselves to accept the lowest or any tender.

JAMES PATERSON, Engineer.

Gas Offices, Mersey Street, Warrington, Sept. 16, 1880.

TO ENGINEERS AND IRONFOUNDERS.

THE Gas Committee of the Corporation of Warrington are prepared to receive TENDERS for HYDRAULIC MAIN, ASCENSION PIPES, and other RETORT-HOUSE FITTINGS.

Plans and specifications may be seen at the Offices of the undersigned, and copies of the same may be obtained on payment of 10s., which will be returned on receipt of a *bona fide* tender, which must be endorsed "Ironwork Contract, No. 12," and delivered not later than Thursday, the 14th of October next.

The Committee do not bind themselves to accept the lowest or any tender.

JAMES PATERSON, Engineer.

Gas Offices, Mersey Street, Warrington, Sept. 16, 1880.

MR. CORBET WOODALL, C.E.,

Has Removed his Office to

PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

NOTICE OF REMOVAL.

THE Owners of the Birtley Iron-Works and Pelaw Main Collieries have REMOVED their London OFFICES from 101, Cannon Street, to No. 46, Cannon Street.

Their Warehouse for Gas and Water Pipes and other Castings, &c., is at Scott's Wharf, Bankside, Southwark, LONDON.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

EXHIBITION OF APPARATUS
FOR THE
UTILIZATION OF GAS, ELECTRICITY, &c.,
BURNBANK DRILL HALL, GT. WESTERN ROAD, GLASGOW.

OPEN FROM 10 A.M. TILL 10 P.M.
Commencing Sept. 28.

Every kind of Gas Apparatus and Appliances of the most improved character. The Largest Gas Light in the World; the Albo-Carbon Light; Dr. Adams's and other Gas-Heating and Cooking Stoves; Gas-Meters in great variety, shown in action; Gas-Engines at work; Gas-Tar Products, including the latest triumphs in obtaining brilliant colours from the Tar Pit; Shale Oils and Gasoline Machines; Grand Display of Oil Lamps; Various Systems of Electric Lighting; Lighthouse Apparatus; Gas-Lighted Buoy in action; Telephones; Fog-Signalling Apparatus; Water-Engines and latest forms of Water-Meters; Miners Safety Lamps of many forms, including a "Geordie" of 1816, and a "Davy" of 1820; Fire-Damp Indicators; Great Collection of Scotch Cannel Coal Specimens.

Course of Special Lectures by eminent Scientific Men on Subjects Illustrated by the Exhibition.

Family Season Ticket, £1 1s.
Single Season Ticket, 5s.; with Lectures, 7s. 6d.
Single Admission—Opening Day, 2s. 6d.; following Days, 1s.
Refreshment Department conducted by Messrs. THORNTON (L.te Duncan's), Buchanan Street.

JOHN MANN, C.A., 154, St. Vincent Street, Secretary to Committee.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.

No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.

GARSIDE'S REGISTERED TUBE-VICE takes ⅝ brass to a 2-in. Socket.

May be had direct from the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

WOOD
TROUGHING
For Preserving Service-Pipes.
Price from Three-Farthings per Foot,
In any Lengths.
THOS. PROUD,
Brookfield Works, Icknield St., Birmingham.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.

Now ready, Second Edition, price 7s., by post 7s. 3d., the

GAS MANAGER'S HANDBOOK.

By THOMAS NEWBIGGING, M.I.C.E.

Orders to be sent to

WALTER KING,

11, BOLT COURT, FLEET STREET, LONDON, E.C.

ANTI-CORRODO TUBES
(BARFF'S RUSTLESS PROCESS)

See Professor FOSTER'S *Article on "The Corrosion of Iron" in* JOURNAL *of March* 30, 1880.

THE RUSTLESS AND GENERAL IRON COMPANY
(JAMES E. AND SAMUEL SPENCER),
Makers of ANTI-CORRODO (BARFF'S) TUBES AND FITTINGS
For Gas, Steam, and Water; also Black Galvanized and Enamelled.

WORKS: **West Bromwich.** | *Quotations and Pamphlet on application to* **97, CANNON STREET, LONDON, E.C.** | LIVERPOOL OFFICE **34, Moorfields.**

JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

THE Directors of the Farnworth and Kearsley Gas Company are prepared to receive TENDERS for the Surplus TAR and AMMONIACAL LIQUOR produced at their Works, together or separately, for the term of One, Two, or Three years.

Tenders, sealed and endorsed, to be addressed to the Chairman, J. Warburton, Esq., and sent on or before Saturday, Sept. 25.

Any further information may be obtained from the Manager,

T. L. SHEPPARD.

EAST GRINSTEAD GAS AND WATER WORKS.

TO GAS ENGINEERS.

CONTRACT No. 7.

THE Directors of the East Grinstead Gas and Water Company are prepared to receive TENDERS for the Construction and Erection of a Set of Two PURIFIERS, 8 ft. square, and a SCRUBBER, 2 ft. 6 in. diameter by 29 ft. high, at their Gas-Works, East Grinstead, in the county of Sussex.

Specifications can be obtained on payment of 10s. 6d. each, and the drawings and particulars can be seen at the Office of the Engineer, Mr. Edward Easton, C.E., 9, Delahay Street, Westminster, S.W., after Wednesday, the 22nd inst.

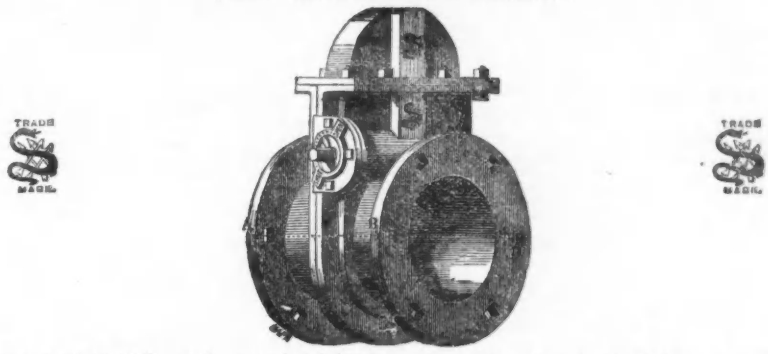
Sealed tenders, endorsed "Tender for Purifiers and Scrubber," must be sent in to the Company's Secretary, at East Grinstead, on or before Oct. 5, 1880.

The Directors do not bind themselves to accept the lowest or any tender.

E. A. HEAD, Secretary.

Gas and Water Company's Office,
East Grinstead.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES
WITH WROUGHT-IRON PINIONS.



These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.
In ordering Valves, please state whether required for under or above ground, and if to be with flanges or spigots and sockets cast on, or with separate spigot and socket pieces.

ALSO MAKERS OF
J. BEALE'S NEW PATENT GAS EXHAUSTERS, STEAM-ENGINES for Driving Gas Exhausters,
VALVES FOR AMMONIACAL LIQUOR, TAR, &c., IMPROVED BRIDGE VALVES for Regulating the Seal in Hydraulic Mains, so arranged that when once adjusted for the proper overflow they can be closed entirely and opened again without altering the adjustment.
GAS THROTTLE-VALVES, SPECIAL GAS-VALVES with Columns, Gauges, &c.
BYE-PASS VALVES, SCREW WATER-VALVES, &c., &c.

B. DONKIN & CO., BERMONDSEY, LONDON, S.E.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out of* ACTION.

Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

ANSELL'S PATENT
GAS LEAKAGE INDICATOR OR DIFFUSIOMETER

Should be in the hands of all Gas Companies and Gas Engineers. It is a safe and certain substitute for a light, and renders risk of explosions impossible.

[See *Illustrated London News*, Sept. 18th, page 296. Also article in the JOURNAL for Sept. 7.]

This is the most important invention for Gas Companies of late years.

ORDERS TO

R. MACPHERSON & CO.,
KENTISH TOWN, N.W., or 9, COAL EXCHANGE, E.C.

Instruments exhibited in action Mondays, Wednesdays, and Fridays, at our Coal Exchange Show Rooms, 2 to 3 o'clock, or at our Kentish Town Works daily.

WILLIAM SUGG,

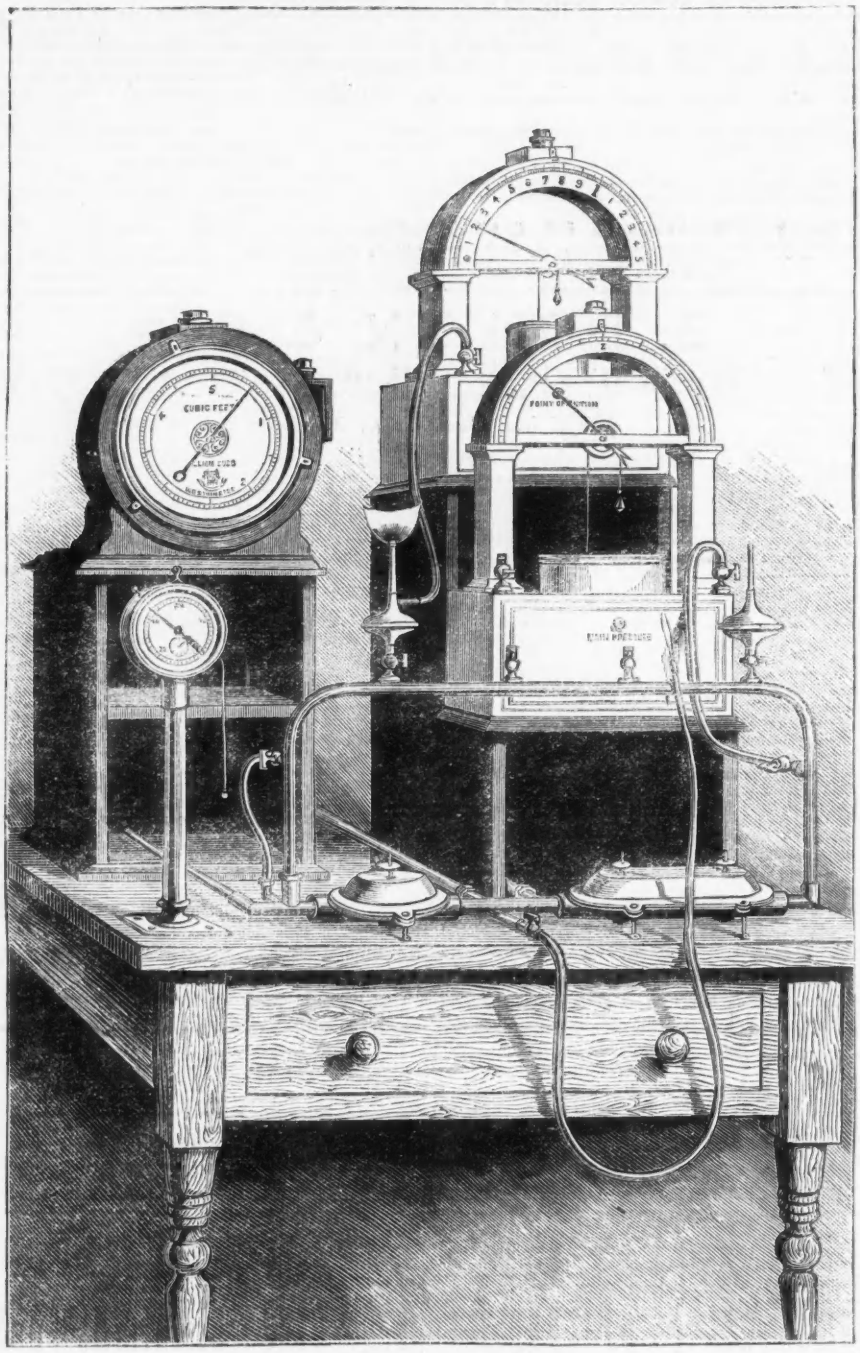
ENGINEER,

VINCENT WORKS, VINCENT STREET,

WESTMINSTER, S.W.

SUGG'S IMPROVED PATENT STREET-LAMP METERS (Kensington Pattern),
IMPROVED STREET-LAMP GOVERNORS, COCKS, TORCHES, LANTERNS, COLUMNS (own Pattern),
and every Requisite for Modern Street Lighting.

PRICES AND ILLUSTRATIONS ON APPLICATION.



SUGG'S IMPROVED SYSTEM OF STREET LIGHTING WITH ARGAND AND FLAT FLAME BURNERS OF HIGH ILLUMINATING POWER.

PRICES AND PHOTOGRAPHS ON APPLICATION.

[Entered at Stationers Hall.]

WILLIAM SUGG'S
IMPROVED APPARATUS FOR TESTING
STREET-LAMP GOVERNORS.

PRICES COMPLETE, AS ABOVE, ON APPLICATION.

5

SAMUEL CUTLER & SONS,

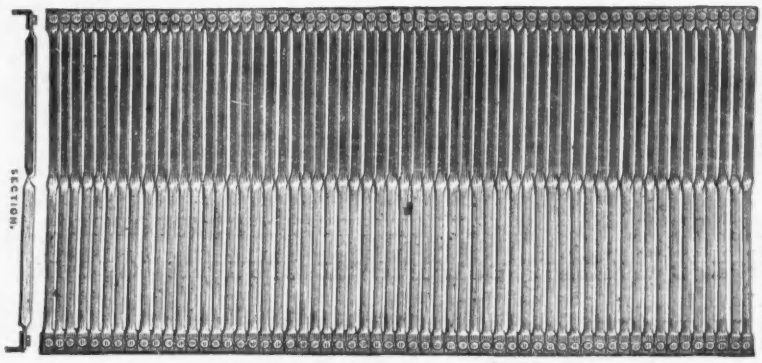
MILLWALL, LONDON, E.,

CONTRACTORS FOR THE

ERECTION OF GAS AND WATER WORKS,

Undertake their ENTIRE ERECTION or EXTENSION in any part of the World, including Small Works for VILLAGES and MANSIONS, as well as of very LARGE EXTENT. Have recently constructed for the PHŒNIX GAS COMPANY the LARGEST GASHOLDER yet erected.

S. C. and SONS supply *every* requisite for Gas-Works, and keep in stock Small Articles, such as BARROWS, SCOOPS, RETORT-LIDS, BOLTS, &c.; and they manufacture WOOD SIEVES of a very superior description.



CUTLER'S PATENT WATER-VALVES

Are the very best possible as PURIFIER VALVES; leakage impossible, most easy to work, never get out of order or the worse for wear, and can, if desired, be very simply arranged to work the whole or a part of a set of Purifiers in any conceivable order whatever. Have already been erected and approved at the London Gas-Works, Nine Elms; Phœnix Gas-Works, Greenwich; Maidstone, Ipswich, &c.

Full Particulars on Application.

CUTLER'S PATENT SIEVES

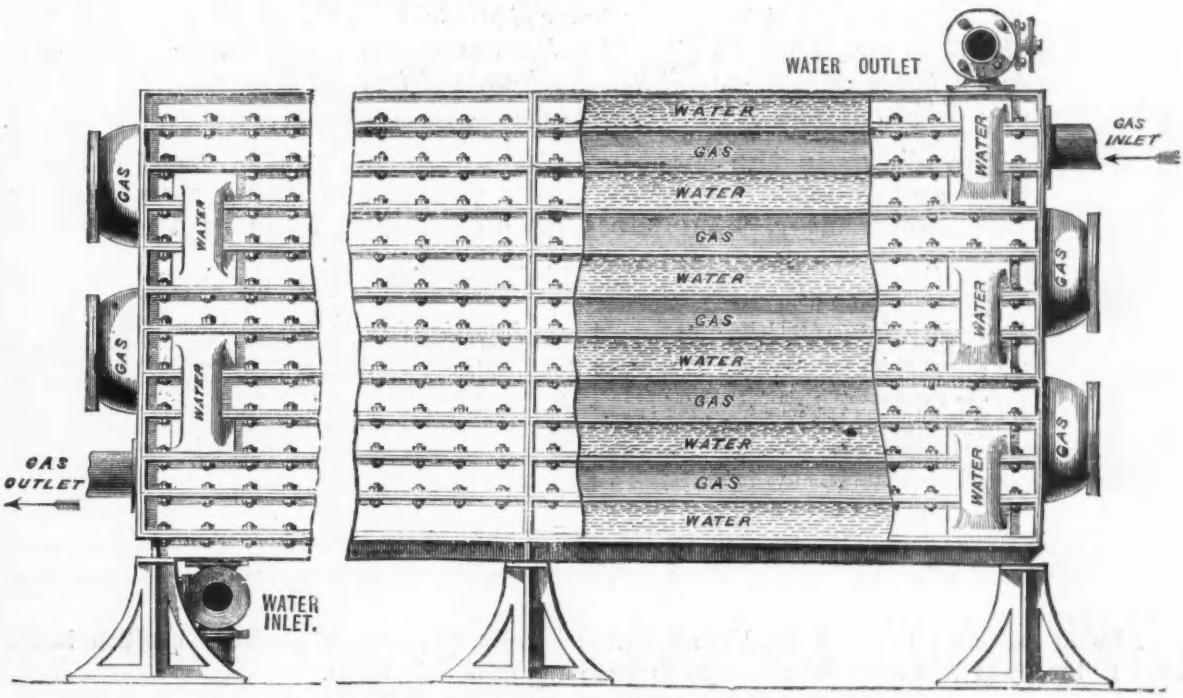
Are the most durable. The sieve bars presenting an inclined plane to the flow of the Gas, offer the least possible resistance, greatly reducing pressure, and permitting contact with every part of the purifying material. Have been supplied to many of the London and Provincial Gas-Works, and give great satisfaction.

Copies of Testimonials on Application.

MORRIS AND CUTLER'S PATENT CONDENSERS

Adopt water as a cooling medium, the respective streams flowing in opposite directions; quantity of water required but small, and being only raised in temperature, is useful for any purpose of the works. The power of Condensers can be regulated at will by the amount of water permitted to pass through. Erected and giving great satisfaction at Brentford, Tunbridge Wells, Maidstone, Buxton, Phœnix Gas-Works, Greenwich; where its advantages may be seen.

Mr. WATES, of Greenwich, has kindly offered to reply to any inquiries addressed to him as to its efficiency.



Also CUTLER'S PATENT MOUTHPIECE SUPPORTS,

AND

CUTLER'S PATENT REMOVABLE DIPS.

[*See* JOURNAL for Nov. 25, 1879.]

The understated declaration with which we introduced our apparatus when the Argand system was in the full tide of its fame, has been fully borne out by general experience, namely—

"THE FLAT-FLAME IS THE ONLY PRACTICABLE SYSTEM FOR STREET LIGHTING; and, 'in actual use,' yields as much light with Common Gas, and more with Cannel Gas, than any Argand System."

CHARLES HUNT, Esq. (President of the British Association of Gas Managers), in his Inaugural Address to the members at their annual meeting, held in London, June, 1880, said: "Rivalry has stimulated into being, for outdoor purposes mainly, Burners of large power, that have fully maintained the superiority of coal gas over the electric light. To Mr. Bray our thanks are due for his development of the FLAT-FLAME BURNER into a lighting medium of a very high order, *and for his vindication of its claims to practical consideration.*"

The above declaration was received with marked applause by the crowded meeting.

BIRMINGHAM LAMP TESTS.

AFTER the most exhaustive series of experiments, extending over more than twelve months, with the most extensive assortment of Burners and Lanterns of large lighting power ever brought together, the Birmingham Authorities have

ADOPTED BRAY'S SYSTEM

for their Street-Lighting Improvements, for which purpose Sixty-Five 100-candles power Lanterns of medium lighting power are being fixed.

The apparatus used in the above tests were all of our usual medium lighting power class, and the tests showed that we sacrifice a considerable amount of lighting power for general efficiency. The tests further showed that our 80*-candles* HIGHEST *lighting power burner yielded* 3·51 *candles per foot of gas—the quality being* 16·75 *candles* (3·35 *per foot*) *by the standard—which was a higher result than that yielded by any other flat-flame burner, though copies of our Slit-Unions, enlarged and improved by us Jan.,* 1879, *were used by our competitor; and higher than the* 80*-candles power Argands.*

NOTE.—The above is the most conclusive answer to the ever-changing and misleading statements which are being made by our competitor, with the object of taking from us the honours we have secured in open contest.

Extract from the *Leeds Mercury*, April 1, 1880.

At the meeting of the Leeds Town Council, March 31, Alderman Gaunt moved that the Council approve of the acceptance by the Corporate Property Committee of the tender of Messrs. Geo. Bray and Co. for the supply of 21 new lamps, to be placed upon the pillars round the Town Hall. The Committee had tested Sugg's and other lamps, and found Messrs. Bray's the best. It was intended to have two 200-candles power and two 100-candles power, and 17 round the hall of 80-candles power. Mr. Lynd, in seconding the motion, said that he had had an opportunity of seeing different lamps tested at Birmingham, and he was in favour of Messrs. Bray's.

Extract from the *Daily Free Press*, Aberdeen, Jan. 1, 1880.

Judging of the merits of the lights as they appeared last night, on-lookers seemed to be generally of opinion that between Sugg's patent and Bray's larger light at the corner of Union Buildings, Castle Street, there was no perceptible difference in the illuminating power. When the vital question of gas consumption is taken into account, it is found that in the Castle Street lamps there is a marked difference in the quantity of gas consumed, for while 30 feet of gas are hourly burned in Sugg's Patent Lamp, only 20 feet are used by Bray's Lamp during the same period.

[**The above Lamps have Meters attached.**]

BRAY'S LANTERNS have been adopted by the Vestry of St. George, Hanover Square, London, for all the crossings and refuges of that important district, after a direct competition with the Argand system of lighting.

Also more than 50 Towns and Vestries have adopted them, after a similar competition in most cases; and many private users. In all cases they are a pronounced success.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

June, 1880.

Varying & Unvarying Meters.

On the 23rd of June, 1874, "THE JOURNAL OF GAS LIGHTING," when referring to

"THE METER OF THE PRESENT TIME," said:

"We know how easily it can be made to measure against the Company, and we agree with the President (of the British Association of Gas Managers) that there is a necessity that something should be devised to protect the Gas Company from getting less than they ought to do for the quantity of Gas Consumed."

On the 5th of January, 1875, "THE JOURNAL OF GAS LIGHTING," when referring to

"THE WARNER & COWAN METER," said:

"The changes effected in the construction of the Wet Meter are such that it now occupies a position which it never held before—that of an unvarying measure. . . . Both Company and Consumer are now equally protected, perfect accuracy of measurement is obtained, and that, too, without the least increase of mechanism, or the action of the Meter in the least degree being prejudicially affected."

W. & B. COWAN,

(ESTABLISHED 1827,)

CHURCH ST., MILLBANK ST., *LONDON, S.W.* | DUTTON ST., NEW BRIDGE ST., *MANCHESTER.* | BUCCLEUCH ST. WORKS, *EDINBURGH.*

THE

MANN & WALKERS' PATENT SCRUBBER.

Extensive use.

The successful and extensive use of the Mann and Walkers' Patent Scrubbers in all parts of the world has demonstrated their advantages, and entitled them to be received with credit and confidence. The number of them in use is about twenty times that of any other known means of purifying gas from ammonia.

Small quantity of Water required.

By a very small quantity of clean water (not more than 5 or 6 gallons per ton of coals carbonized) the whole of the Ammonia contained in the Gas is completely absorbed; the Gas, after only once passing through, issuing from the Scrubber outlet completely purified from Ammonia. The Scrubber gives no appreciable back pressure.

Residual Product obtained.

The Residual Product—namely, the Ammoniacal Liquor—is obtained at from 20 to 30 ounces commercial strength, which enables it, after being mixed with the weaker Liquor from the hydraulic main and condensers, to be sold to the Manufacturing Chemists, or converted into Sulphate, at the degree of strength found most profitable to the Gas Company.

Illuminating power increased.

The Scrubber is a Saturator, and the Gas being soaked in this strong solution of Ammonia in the lower columns of the Scrubber, is purified from a large amount of Carbonic Acid, and its Illuminating Power is thereby increased.

Small amount of power required.

The friction is so little, and the motion so slow, that the power necessary to work the Scrubber is almost inappreciable. A small gas-engine will work a pair of Scrubbers, purifying 2 million cubic feet of gas per day.

Beckton Gas-Works.

There are thirty of these Patent Scrubbers in the Beckton Gas-Works, equal to purifying 30 million cubic feet per day, and the total amount of engine power necessary to work the whole 30 is not equal to that given out by one 10-horse engine.

Reserve purifying power contained.

There is also a most important advantage arising from the height of these Scrubbers, in the reserve force contained in them. In the event of any stoppage, the mass of soaked and wetted material would continue the purification for hours, even if the supply of water and working were stopped from any cause.

Internal Materials not changed.

The changing of the soaking materials in these Scrubbers is very seldom required; they are well known to remain in action for seven years without being emptied.

Guarantee

They are in all cases erected under guarantees; they easily fulfil the stipulations of any Act of Parliament, and the chemical restrictions of the Board of Trade; and in cost they are much less to a Gas Company than any other known means of purifying Gas from Ammonia.

C. & W. WALKER.

8, *Finsbury Circus, London, E.C.*

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

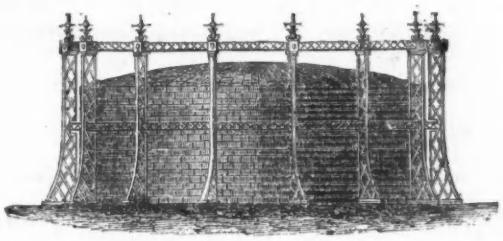
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

WHITEFRIARS STREET, FLEET STREET, LONDON, E.C.,

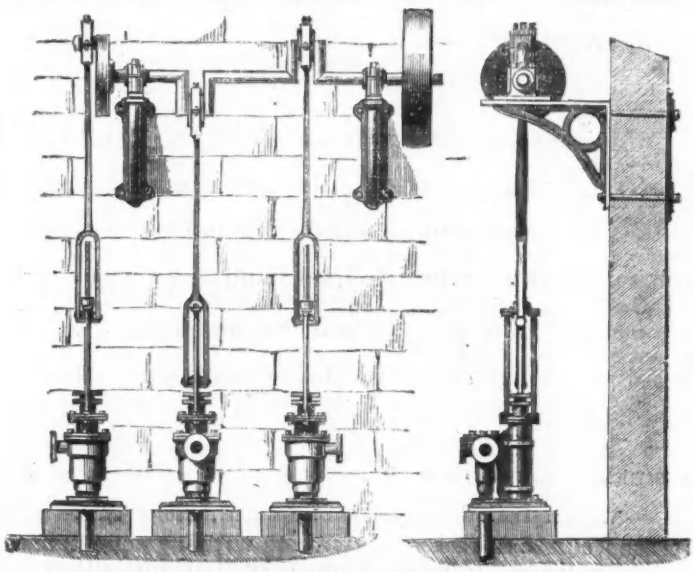
Hydraulic Engineers,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT DIRECT-ACTING STEAM-PUMPS.



IMPROVED DOUBLE-ACTION PUMPS.

For Water. For Tar. For Ammoniacal Liquor.

This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction

These Pumps have been supplied to nearly all the large Gas Companies and Chemical Works, both for Pumping Water, Tar, and Ammoniacal Liquor.

GAS SYPHON PUMPS, IN COPPER OR SHEET IRON, ALWAYS IN STOCK.

Illustrated Catalogues sent post free on application.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

MECHANICAL AND CONSULTING GAS ENGINEER,

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

ALFRED LASS,

Fellow of the Institute of Chartered Accountants,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analysed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

MR. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

THOMAS PROUD,

BROOKFIELD WORKS,

103, ICKNIELD ST., BIRMINGHAM,

MANUFACTURER OF

WOOD GRIDS

FOR

PURIFIERS AND SCRUBBERS,

AND

GENERAL STEEL AND IRON TOOLS AND MATERIAL USED IN GAS-WORKS.

BOX'S PATENT STREET GAS-LAMP

Has the following good qualities:—

1. No putty or other material is required for glazing. Thus there is no hacking out of old putty on removal of the glass, with the *consequent damage* to the lamp frames. 2. No liability to breakage by unequal expansion of the glass caused by changes of temperature. 3. Any inexperienced workman can glaze the lamp in a few minutes. 4. The system of glazing can be applied to any existing lamp at a trifling cost. 5. It is cheap, strong, and durable. 6. The glass can be easily removed so that the frames can be thoroughly painted inside and out.

The lamp may be supplied fitted with clear opal or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing lamps to this system can be supplied at moderate prices and a small charge for royalty. Licences granted on the most reasonable terms. For further particulars apply to the Patentee,

Gas-Works, Crayford, Kent. W. W. BOX,

RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

TREES BOGHEAD.

SHOTTS BOGHEAD,

And all the first-class Scotch Cannels.

Prices and Analyses on application.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

39, QUAYSIDE, NEWCASTLE-ON-TYNE.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of 16·67-candle gas, with 1490 lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON. London Agent: Mr. F. J. LEE SMITH, Bromley, KENT.

STEPHEN HOBBS,

OF

CLARENCE VILLA, RAMSGATE,

CONTRACTOR FOR WELL SINKING

AND

SEWERING WORK GENERALLY,

Begs to inform Engineers and others that he has just completed the extensive and important excavations, amounting to 4000 cubic yards, for the Ramsgate Improvement Commissioners (under the direction of their Engineer, Mr. Valon), whereby a good and abundant supply of water has been obtained, and is now in a position to undertake further work in town or country.

References kindly permitted to be made to MR. WILLIAM A. VALON, C.E., RAMSGATE. Additional testimonials if required.

IMPORTANT to GAS COMPANIES.

MESSRS. JOHN ABBOT & CO., LIMITED,

OF SUFFOLK LANE, LONDON, AND GATESHEAD,

Manufacture and Erect

SULPHATE PLANT

On the most Modern and Improved Plan.

EXAMPLES

Can now be seen at

NEWCASTLE, CARLISLE,

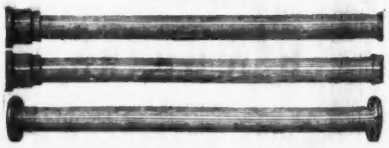
And will shortly be erected at the New Gas-Works,

TUNBRIDGE WELLS.

WILLIAM MACLEOD & CO.,

30, ST. ENOCH SQUARE, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



Sole Agents in Scotland for the Torbay Paint Co.

Prices on application.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES.

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

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WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

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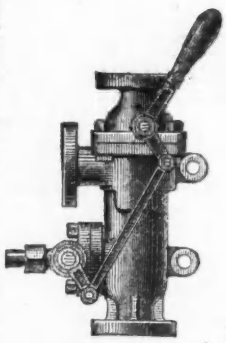


KÖRTING'S UNIVERSAL INJECTOR,

ENTIRELY SELF-REGULATING.

LIFTS 26 FEET.

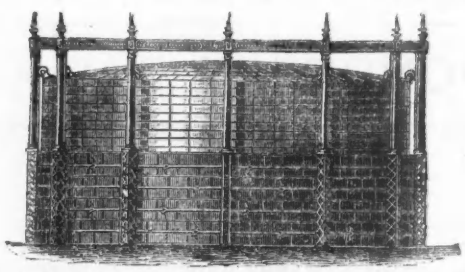
FEEDS WITH HOT OR COLD WATER.

WORKS WITH HIGH OR LOW STEAM PRESSURE.

Price Lists on application to

KÖRTING BROTHERS,

17, LANCASTER AVENUE, MANCHESTER.



HENRY BALFOUR & CO.,

ENGINEERS, IRONFOUNDERS, AND GAS APPARATUS MAKERS,

39, FINSBURY CIRCUS, LONDON, E.C.

Works: DURIE FOUNDRY, LEVEN, FIFE, N.B.

MANUFACTURERS OF

GASHOLDERS, SINGLE OR TELESCOPE, WITH OR WITHOUT COUNTERBALANCE GEAR; TANKS, CAST & WROUGHT IRON.

BOILERS, CONDENSERS, CRANES, EXHAUSTERS AND ENGINES,

GIRDERS (Cast and Wrought Iron), IRON PIPES, PUMPS, PURIFIERS, RETORTS & FITTINGS, ROOFS, SCRUBBERS, SHAFTING, VALVES, WASHERS.

ANDERSON'S PATENTED INVENTIONS, VIZ.—

FOUR-WAY BYE-PASS VALVES, ENGINES AND EXHAUSTERS, REVOLVING BRUSH SCRUBBERS, GAS-WASHERS, FUEL-MAKING MACHINES, GOVERNORS, &c.

H. B. & Co. undertake Contracts for the Supply and Erection of Gas-Works, either for Towns or Mansions, or the Remodelling of existing Works.

SHIPPING ORDERS receive special attention.

H. B. & Co. having had large experience in this Department, undertake to ship, f.o.b., properly packed and marked for export.

ESTIMATES AND DESIGNS ON APPLICATION.

ALDWARKE MAIN AND CAR HOUSE COLLIERIES,

Near ROTHERHAM.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD.

PROPRIETORS.

The Aldwarke Main Brights is a first-class gas-making and coking Coal, yielding by analysis 12,600 feet of 19-candle gas per ton, and giving "Weight of illuminating matter in lbs. of sperm, 820·80." It is very free from impurities and foreign matter.

Copies of Analyses made by Gas Companies who have used it will be forwarded and Samples sent on application.

THE LOCHORE & CAPLEDRAE CANNEL COAL COMPANY,

Limited,

Beg to intimate that the development of their Mines is progressing favourably, and that they are now in a position to supply their famous Cannels.

Quotations and full Analyses will be supplied on application addressed to the Company,

LOCHGELLY, FIFESHIRE, N.B.

Abstract of Analyses made by Dr. WALLACE, Gas Analyst for the City of Glasgow.

	Cubic Feet per Ton.		Illuminating Power.		Equivalent of a Ton in Sperm.
Plesio Boghead	13,165	....	36·16	....	1632
Brown Capledrae.	12,210	....	38·46	....	1610

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

MIDLAND DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: A. C. SCRIVENER,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

CANNEL AND GAS COALS.

THE DUKINFIELD COAL AND CANNEL COMPANY are prepared to deliver, to any Station, their Celebrated GAS COALS, which have a very high reputation for quantity of Gas and Illuminating Power, and make a First-class Coke.

Analyses and terms of delivery may be obtained by communicating with the above Company, at their Offices,

DUKINFIELD, NEAR MANCHESTER.

LONDONDERRY GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES.

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

London Agents: Messrs. LAMBERT BROS., 85, GRACECHURCH ST., E.C.

THE

THAMES BANK IRON COMPANY,

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS AND ALL KINDS OF GAS-WORKS APPARATUS,

SOCKET-PIPES FOR GAS OR WATER PURPOSES,

FLANGE-PIPES FOR STEAM,

RAIN-WATER PIPES AND GUTTERS,

HOT-WATER BOILERS, PIPES, AND CONNECTIONS,

LAMP-COLUMNS, LAMPS, LAMP-FRAMES, WROUGHT TUBES, &c.,

HOT WATER AND HOT AIR APPARATUS,

Erected complete on the most Improved Principles.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of **THE ORIGINAL SILICA OR DINAS FIRE-BRICKS.** Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

W. C. HOLMES & Co.,

ENGINEERS AND CONTRACTORS

FOR

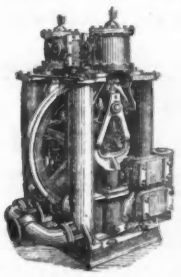
GAS AND WATER-WORKS,

WHITESTONE IRON-WORKS,

HUDDERSFIELD.

REFERENCES TO UPWARDS OF 400 WORKS.

John Cameron's Specialities



ARE HIS

PATENT LEVER

PUNCHING MACHINES

AND HIS

STEAM-PUMPS

FOR

GAS-WORKS.

Feeding Boilers, Steam Fire-Engines, Colliery Deep Lifts, Irrigation, Contractors, and Chemical purposes.

WORKS:

OLDFIELD ROAD, SALFORD, MANCHESTER.

CROLL'S
DRY GAS-METERS,

PRIZE MEDALS. (INVENTED & PATENTED IN 1844,) PRIZE MEDALS.

LONDON, 1851; NEW YORK, 1853; PARIS, 1855. COMBINING ALL THE LATEST IMPROVEMENTS, LONDON, 1862; DUBLIN, 1865; PARIS, 1867.

MANUFACTURED ONLY BY

THE GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON, N.E.

SOLE AGENT FOR SCOTLAND: JAMES KEITH, EDINBURGH AND ARBROATH.

OF IMMEDIATE IMPORTANCE TO ALL GAS FACTORIES.

HARRIS & PEARSON, of Stourbridge, have an immense stock of **FIRE-CLAY GAS RETORTS,** all perfect and in good condition, and can supply orders of any magnitude, to any size or pattern, immediately on receipt of specification. Any Gas-Works disappointed by delay in the execution of Retort orders will do well to take advantage of this. Inspection invited.

HARRIS & PEARSON manufacture best Retort Bolts, Cast Iron Retort Mouthpieces, Fittings, and Lids, Cast Iron Gas and Water Pipes, and Connections of all Shapes and Sizes.

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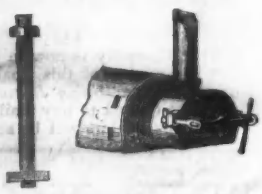
Prices, Drawings, and Specifications if desired.



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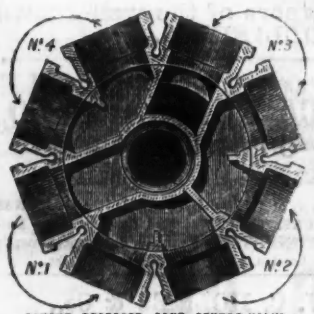

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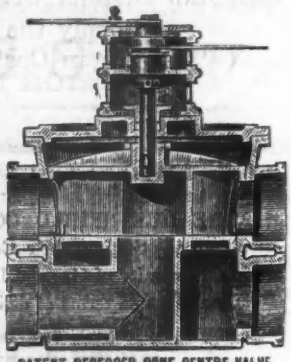

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